THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXV. No. 1673.] LONDON, JUNE 4, 1895. [47TH YEAR. PRICE 6d.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works
(also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

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Best Absorbent of Sulphuretted Hydrogen, &c.
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PRICES, &C., ON APPLICATION.

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LANEMARK CANNEL AND GAS COALS.
Quotations and Analysis on Application to
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NEW CUMNOCK, N.B.
Shipping Ports: All the principal Scotch Ports.

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FOR TOWN WATER-WORKS AND OTHER SUPPLIES.
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BURNS ANY KIND OF WASTE FUEL TO ADVANTAGE.

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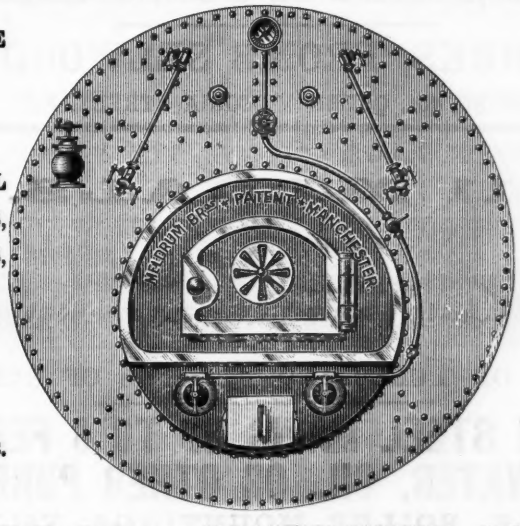

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Wrought-Iron Roofs, Bridges, Girders, &c.,

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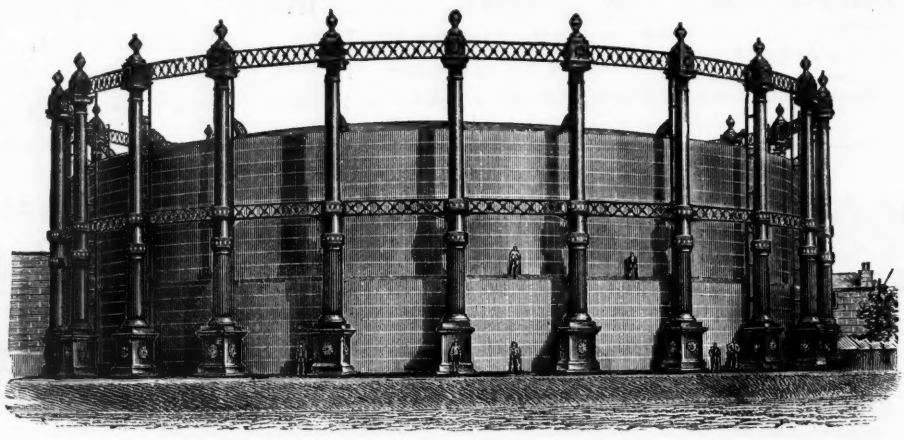

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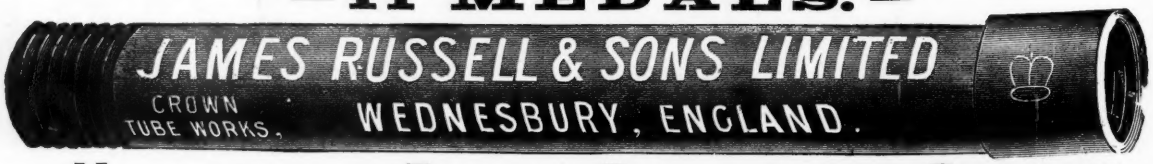

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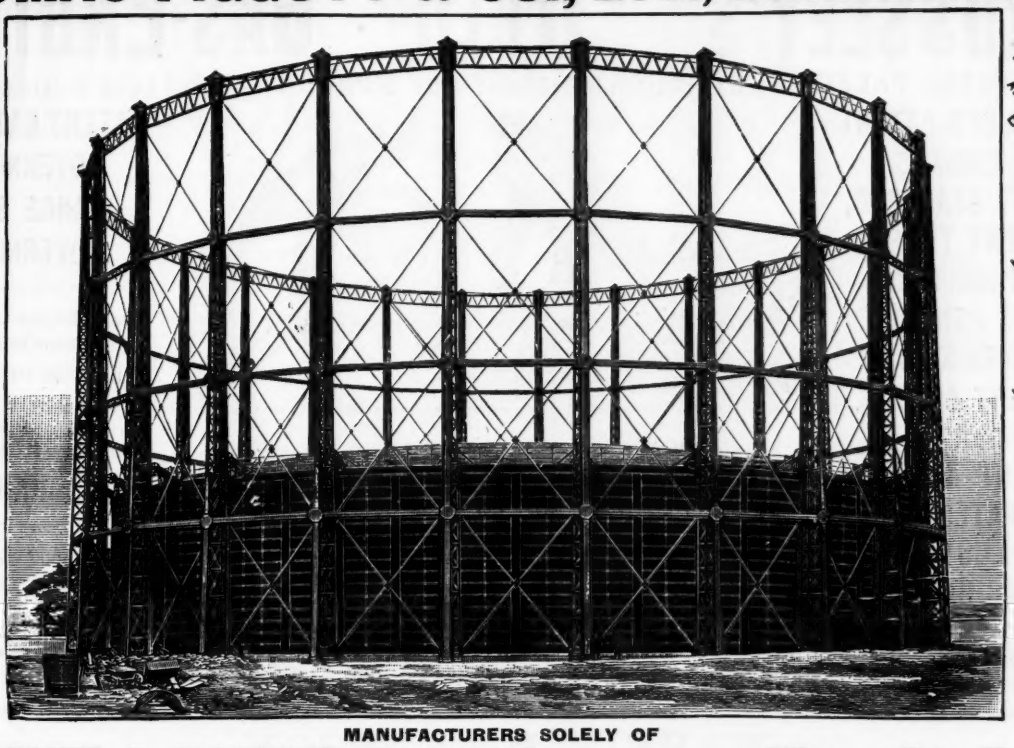

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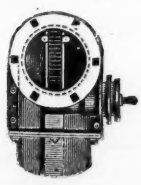

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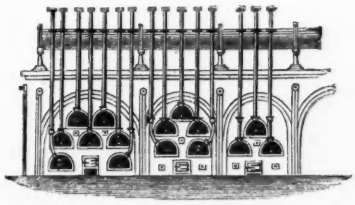

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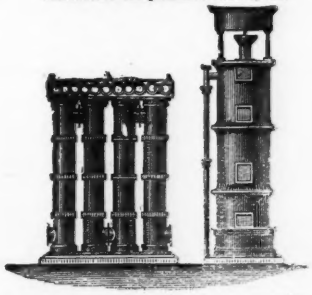
TAR AND LIQUOR PUMPS, &c.



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CENTRE-VALVES
for working Purifiers,
Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,
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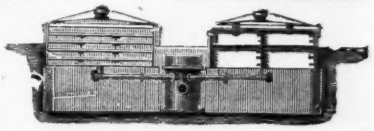

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GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

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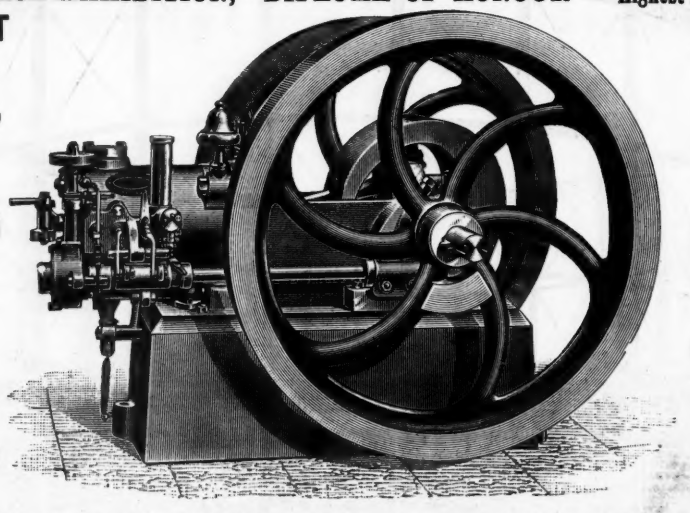

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Every Engine thoroughly tested before being sent out

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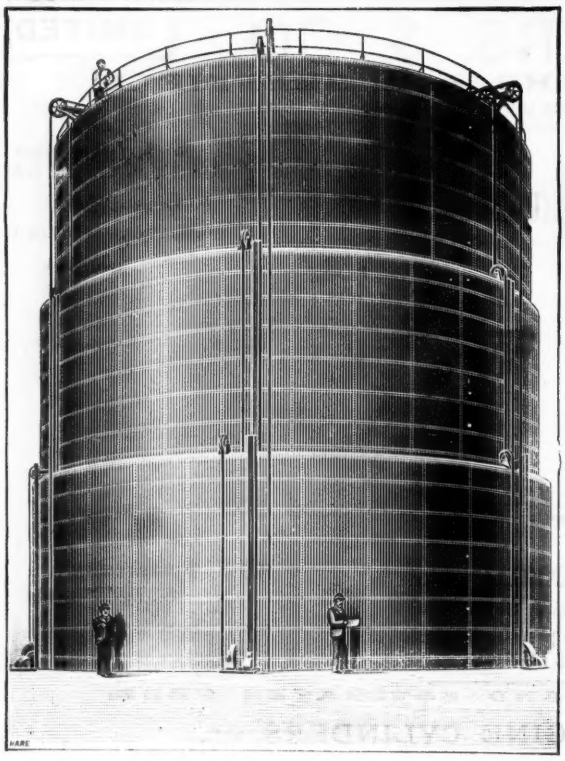

From Photo. of Three-Lift Roped Holder, 50 feet diameter by 18 feet deep each Lift. Erected at Sligo, 1894.

Pease's Patent Roped Gasholders

THESE HOLDERS HAVE WORKED SUCCESSFULLY UNDER EVERY TEST TO WHICH THEY HAVE BEEN SUBJECTED SINCE 1889.

MAY BE SEEN AT MANY PLACES.

Send for Catalogue if requiring increased Storage.

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Over 50 Maxim Patent Carburettors have now been fixed, capable of enriching

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CUBIC FEET OF GAS PER DAY.

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The Enrichment is **INSTANTANEOUS** and **PERMANENT.**

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Dealers in Carburine and all other Naphthas for the Enrichment of Gas.

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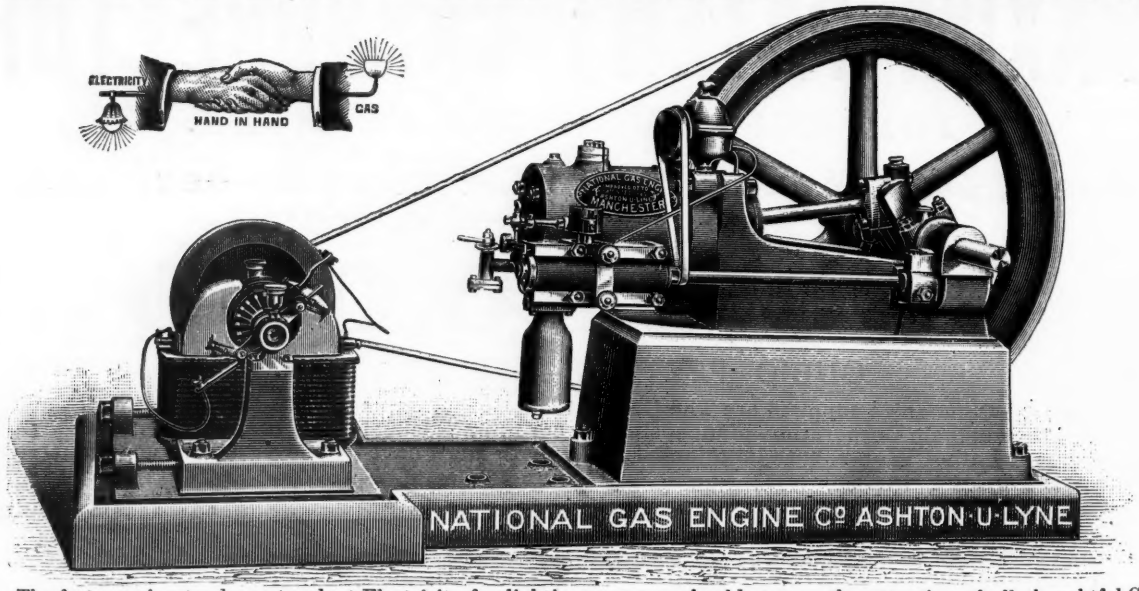

The fast growing tendency to adopt Electricity for lighting purposes should engage the attention of all thoughtful Gas-Works Managers and those interested in Gas Companies.

By the aid of the Gas-Engine driving the Dynamo, **50 PER CENT. MORE LIGHT CAN BE OBTAINED FROM THE SAME GAS**; and thus, by their adoption as the motive power, the gas consumption of the district can be maintained and the light increased.

The **NATIONAL GAS-ENGINE** is specially constructed for this purpose, both for Small Installations for isolated places, and also for large Central Electric Light Station Work.

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MAINTAINS A HIGH STANDARD IN RESIDUALS.

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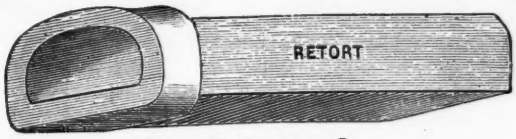

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N.B.—Gas, Blast-Furnace, and Glass-House Bricks and Glass-House Pots always in Stock, or made on the Shortest Notice.

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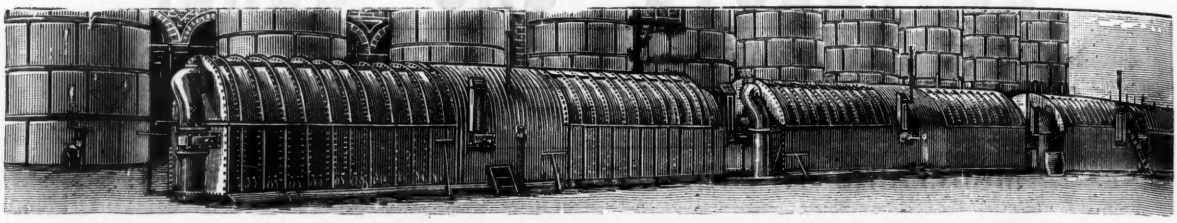
PATENT "STANDARD" WASHER-SCRUBBER

☛ **492** of these Machines (capable of dealing with **472,540,000** cubic feet of Gas daily) in use, which fact is given as evidence of this apparatus being the Most Efficient of any in the Market for the extraction of Ammonia, Carbonic Acid, and Sulphuretted Hydrogen from Coal Gas.



View of SIX PATENT "STANDARD" WASHER-SCRUBBERS, erected at the Beckton Station of The Gaslight and Coke Company (the Engines driving same being under Galvanized Iron Covers). This Company have **30** of these Machines in use. They are also in operation at a great number of Gas and other Works in this Country and Abroad.

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Extracts practically all the Tar without choking up, and gives minimum back-pressure.

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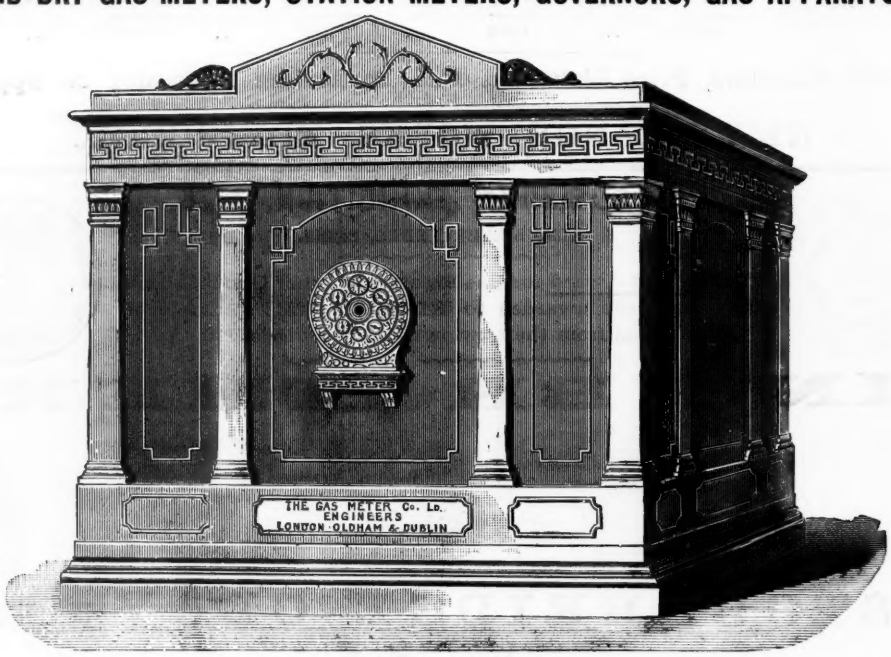

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DESIGN No. 2 PATTERN.

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PURIFIERS with Planed Joints.

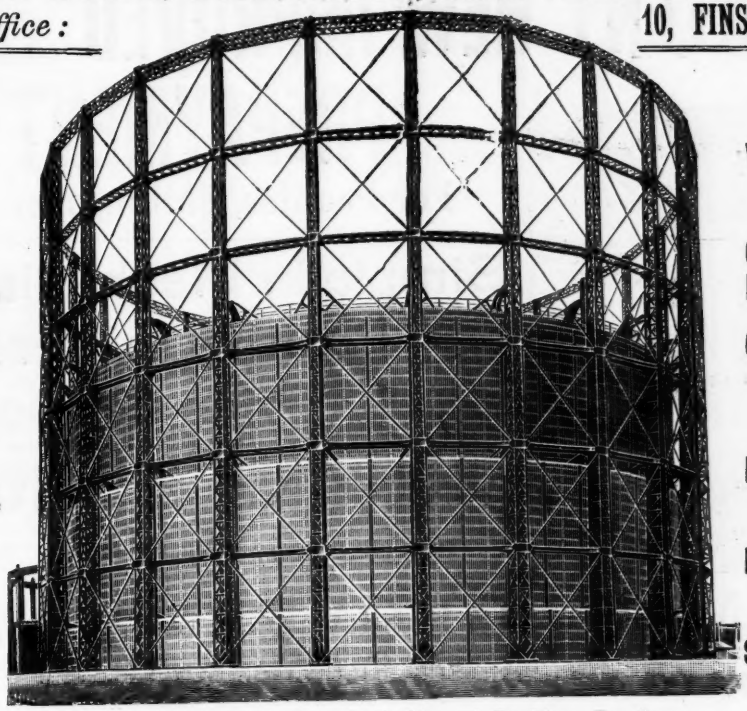
TOWER SCRUBBERS.

WECK'S PATENT CENTRE-VALVE.

CONDENSERS.

TAR PLANT.

SULPHATE OF AMMONIA PLANT.



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WASHER-SCRUBBERS.

CLAUS' SULPHUR-RECOVERY PLANT.

CENTRE & FOUR-WAY VALVES.

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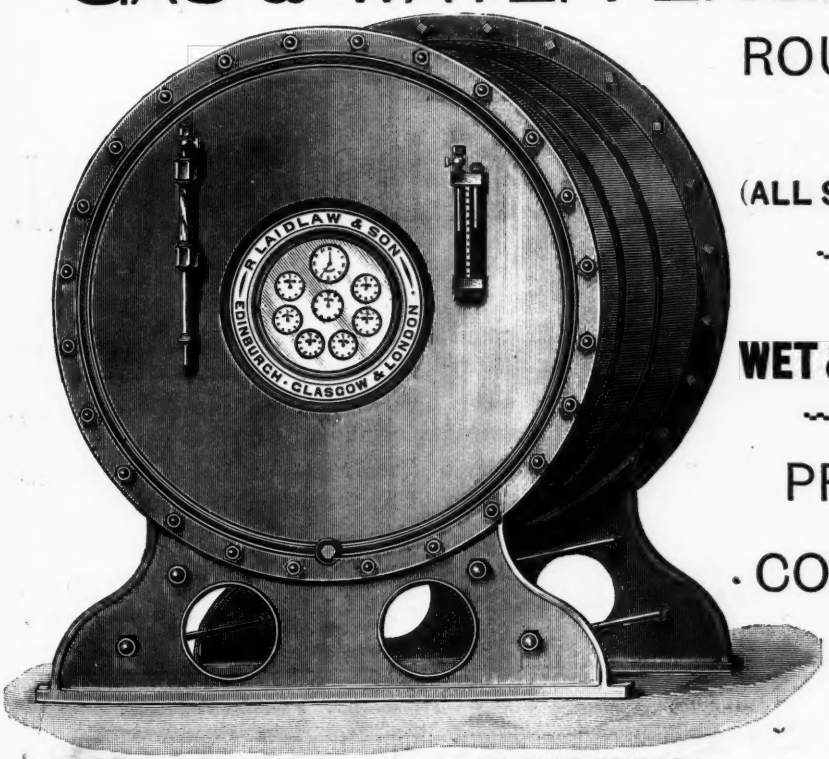
RETORT-MOUTHPIECES.

SLIDE-VALVES, TAR-BURNERS, SIEVES.

WALKER'S PATENT PURIFYING-MACHINE.

R. LAIDLAW & SON,

GAS & WATER ENGINEERS.



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CONSUMERS'

WET & DRY GAS-METERS.

PREPAYMENT AND COMPENSATING METERS.

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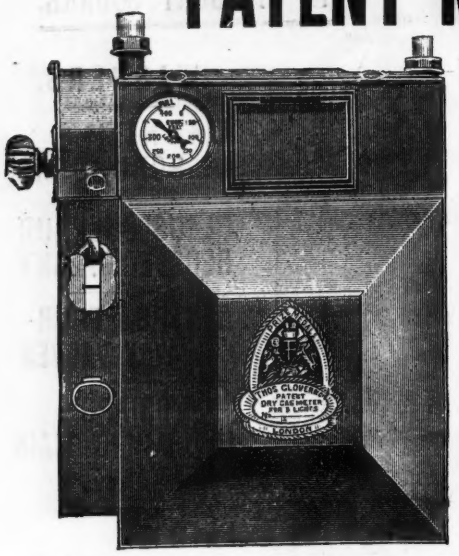
THOMAS GLOVER & CO.'S

PATENT NEW IMPROVED PREPAYMENT METER



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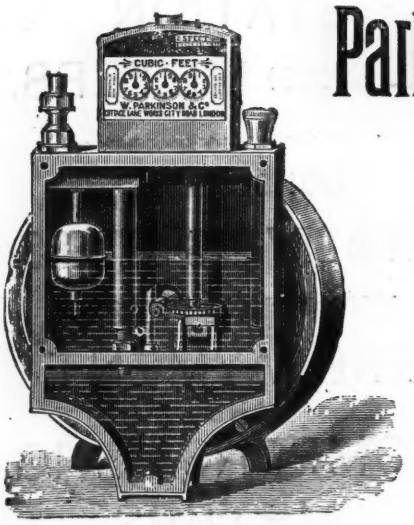

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

The Question of Inclined Retorts.

IN another column, we describe, from a recent inspection, the actual condition of the inclined retort carbonizing plant at Brentford; and it is to be hoped, for the satisfaction both of believers in the principle and of sceptics, that our example, of going and seeing what Mr. Husband is doing, and not resting content with a knowledge of what he has been saying with regard to the performance of this plant, will be widely followed. Without attempting to open up the whole question again in this place, we make bold to say that the sloping retorts are anything but the exploded fancy their opponents are fain to argue of them. The vicissitudes of the system in this country have only repeated those of the regenerative retort furnaces. Both suggestions, though not strange to students of old British gas manufacturing methods, came to this country at the last as foreign ideas. As with the German furnaces, so with the French inclined retorts, the essential principle was found to be embodied in a dress which appeared outlandish to British eyes; and, as a natural consequence, the very men who were among the first to perceive that there was "something in it," set themselves to re-embody the principle in what seemed to them to be a more rational presentment—not always successfully. That there was justification for this treatment is now made plain by the circumstance that neither German furnaces nor French retort-settings, though tried over and over again in this country in their native patterns, have established a vogue with us. We have the spirit of the thing in both cases, under several forms; but not a single example of the imported pattern survives. So much was to be expected, seeing that it is a national habit of ours to adapt, and not to rest content with merely adopting, whatever meritorious suggestions we may receive from foreign sources.

The similarity of the histories of furnaces and retort-settings extends to the point of their having experienced equally stormy periods, in which the personalities of those who had to do with them became mixed up deplorably with considerations that should have been treated with a total absence of passion or prejudice. The former have passed through this stage of experience, but the effects are yet noticeable in the technical world; while the latter are just in the thick of it. Without saying anything more about furnaces, it is becoming clearer why sloping retorts have at the present time such an equivocal reputation. They have been introduced, for a variety of reasons, into some places where they were meant to do well, if possible, and also into some other places where they have never been regarded favourably, or treated fairly. A principle which cannot possibly succeed in operation unless certain fundamental requisites are assured, has been tinkered with, handicapped with fatal incompatibilities, muddled by the handling of the careless and the incompetent, and made the agency for obtaining other effects than its own technical triumph. Zeal has not always gone hand in hand with discretion; boldness in adaptation has sometimes been attended by lack of knowledge; ostentation of willingness to experiment has not invariably cast out suspicion of prejudice and impatience. Notwithstanding all these afflictions, the system has taken root and flourished in congenial environments, but nowhere so remarkably as at Brentford, where Mr. Husband has made its cultivation a labour of love, and has been aided in the task both from above and from below. Those who deny his success in this regard, from imperfect knowledge, should go and see for themselves before venturing to utter another word.

We do not pretend to say that the sloping retorts at Brentford or elsewhere constitute an ideal, or even the best-known, means of making coal gas, taking everything into account. What we do say is that they are efficient carbonizers and labour-savers. This is the extent of our testimony; and those wanting more evidence must go elsewhere for it. It is plain, moreover, that while questions concerning make of gas per ton, yield and sale of coke, and so forth, are referable to the character of the coal carbonized, the question of the cost of labour for carbonizing (all other things being equal) resolves itself largely into that of the weight of coal that can be passed through the men's hands or the machines in a given time. With hand labour upon horizontal retorts, the weight of coal that a

man can handle is easily ascertainable. It has an intimate connection, again, with the dimensions of the retort and the character of the setting. With machine work, also upon the horizontal, a slightly different, but yet homologous consideration of weights and measures determines the maximum capabilities of the apparatus. A gang, or a machine, can only do a certain, and by no means a large, number of mouthpieces per diem; and the capacity of these mouthpieces—that is to say, of the retorts to which they are attached—is certainly not capable of infinite extension, for purely physical or mechanical reasons.

Now, with sloping retorts, though there is a limit to the length over which the charge of coal can be trusted to pour itself uniformly—which may be taken, for the sake of argument, at 20 feet—there is no such limit to the width of the retort that can be filled in this way. When a man has merely to pull a lever, it cannot matter to him whether he puts in a 5-cwt. or a 10-cwt. charge. The same observation applies to the coke. When it runs out of itself, the stoker does not care how heavy it is, and does not notice the heat of it in a stage house. So we hear of 24½-inch retorts at Brentford; and there is no mechanical or stoker's reason why they should not run to 26 inches wide, or more. The limit becomes a chemical or a structural one; and thus the possibility of economizing labour costs is put upon a fresh footing. This is not the least interesting aspect of the question.

An Example of Gas Municipalization—Coventry.

The annual report of the Coventry Corporation Gas Committee shows that the last year's profit on the working of the undertaking was the largest ever made. Various causes are assigned for this favourable result; the principal ones being the continuous growth of business, cheapness of coal, an improved residuals market, and, not least, good administration and management. A well-deserved compliment on the last score was paid to Mr. George Winstanley, the Corporation Gas Engineer, at the last City Council meeting. We mention the gas affairs of Coventry on the present occasion because the city offers a good example of the course of a municipalized gas undertaking which is not of the first magnitude, nor specially favoured in any way by circumstances. When the property was taken over by the Corporation, on behalf of the ratepayers, the capital burden stood at about £1000 per million cubic feet of gas produced. At the present time, owing to the increase of business, prudent management, and the operation of the sinking fund, the capital burden has been reduced to £557 per million. Finding themselves in possession of an unexpectedly large surplus, the Committee proposed, after handing over to the city treasury a subsidy equivalent to 6d. in the pound on the district-rate assessment, to pay an extra sum of £2500 into the sinking fund, with a view to accelerating by so much the redemption of the capital debt. Moreover, they offered a reduction of 2d. per 1000 cubic feet in the price of gas for the current year. The City Council have approved of these proposals, with the exception of the additional payment into the sinking fund; so that the clause of the Committee's report dealing with this matter has been referred back to the Committee for reconsideration. It should be stated that the members of the Committee themselves are divided upon the question. We have no wish to criticize the action of the Council in this regard; the matter being wholly within their province to decide in accordance with their own judgment. At the same time, it may be observed, in a general way, that the policy of the majority of the Committee in applying, for the lasting good of the undertaking, a chance surplus of profit, is to be preferred to the alternative course of using the money for the present relief of the rates, or similar temporary object. Without discussing on this occasion the question of relieving rates out of gas profits, it is obvious that there must be a limit to such relief. As the Chairman of the Committee points out, in Coventry the gas consumers are only one-half of the total population of householders; and it would be monstrous to bleed to an unlimited extent the householders who are gas consumers, for the benefit of the other half. It would do them all much more good in the end to convert every householder into a gas consumer; and the best way to set about doing this would be to reduce the price of gas to the lowest figure, while removing all restrictions in the way of increasing the connection, and doing everything possible to popularize gas in all directions. A small amount of capital is the first requisite for obtaining cheap gas anywhere. What the City Council of Coventry ought to consider in this connection is, not whether their gas undertaking stands as well in the matter of capital charges as those of their neighbours; for this is merely to keep within what may be, in reality, a vicious circle. If A is never to reform his ways because he sees that B is no better than himself, there can be no advance for either along the upward road. Let Coventry do its best, and set an exampel, if possible, instead of excusing itself. This is the worthier part.

Arithmetic Extraordinary.

In a recent issue of the *Daily Chronicle* (the self-appointed champion of Progressivism and all the other "isms" that usually go with this great and noble idea), there appeared a paragraph conveying the truly startling intelligence that "two guineas a year is the present which every man, woman, "and child in London gives to three great Gas Companies." The statement was supported by a reference to the parliamentary return relating to the statutory Gas Companies of the United Kingdom, which was described as showing that for Greater London "the total annual profit which "the gas consumers give to the owners is not far short "of £2,000,000." This is, of course, a dreadful impeachment; but may we ask our perfervid contemporary how this figure works out to the amount stated per head of the Metropolitan population, which is not very much less than 4½ millions for the area that must be taken into the account? Progressivist statistics are often puzzling; but this last exercise transcends for brilliancy everything of the kind that has ever come under our notice. The egregious statement in question would be unworthy of even passing notice if it stood alone; but as it is only a drop of many similar contributions to the carrying out of the insidious policy of "filling up the cup," it should not be permitted to pass unridiculed. This sort of thing may be Progressivism; but plain men will be apt to give it a much shorter name. We have to assure our contemporary that nothing will be gained by its attempt to create ill-will to the London Gas Companies by spreading the false assertion that every man, woman, and child in London would be one penny the richer if no such organizations existed. The policy is so childish that it does not even provoke a smile of contempt. Yet this is the sort of thing that is made to pass current under the name of Progress! It is no wonder that the municipal version of the idea indicated by this sorely strained word is not greatly fancied by the London electorate just now. The average Londoner may be indifferent to municipal politics; but he knows that two and two make four—which numerical fact seems to be beyond the grasp of his would-be leaders of the Progressive Press.

The Reports of the Inspectors under the Alkali Act.

The annual reports of the Chief and the District Inspectors under the Alkali Works Regulation Act always contain some interesting reading for gas managers; and the report which has just been issued forms no exception to the rule. Among other suggestive observations of the Chief Inspector (Mr. A. E. Fletcher) may be mentioned those referring to the sulphate of ammonia industry, which is described as a pure saving of valuable material once all thrown away. "Ammonia," he says, "is not a manu- "factured article; all we have is saved as a bye-product "that at one time was wasted." Even yet very much more is wasted than is saved, although the production of sulphate amounted last year to upwards of 160,000 tons. It will strike purists of language that in the passage we quote Mr. Fletcher employs the word "manufactured" in a peculiar way. In one sense, of course, ammonia in the form of sulphate is a manufactured article. But what Mr. Fletcher wants to imply about ammonia is that it is always a residual product incidental to a manufacturing process; and, as a matter of fact, there is no word in the English language competent to express the idea. Unfortunately, in recovering residual ammonia as sulphate, another residual appears—sulphuretted hydrogen; and a very noxious and most troublesome "incidental" it is. Mr. Fletcher says that the best way of dealing with it, when in sufficient quantity and continuously produced, is to burn it so that the resulting sulphurous acid and steam pass into a sulphuric acid chamber, and are then used in the manufacture. Next to this, the Claus kiln affords a suitable and economical means of dealing with

the gas; and smaller quantities can be absorbed in oxide of iron. Only where the quantity of sulphuretted hydrogen is very small, as in a village gas-works, is it admissible to burn it. Mr. Fletcher gives a table showing how the problem of the disposal of sulphuretted hydrogen resulting from the manufacture of sulphate is actually solved in different places. A particularly interesting part of his report is that devoted to the consideration of coal smoke, which is admittedly not a duty imposed upon the Inspectors under the Alkali Act. It is a cause of thankfulness that the Inspectors' sense of public duty nevertheless leads them to pay attention to this subject; for there is nobody else to direct public opinion in regard to what is really a grave national evil. Speaking of black factory smoke, the Chief Inspector states that a forthcoming report from a Manchester association of manufacturers will show abundantly that means now exist for preventing the discharge of black smoke without any sacrifice of economy, particularly where the firing can be carried on fairly regularly. When he comes to consider the case of the open house fire, however, Mr. Fletcher becomes as near to being despondent as it lies in his optimistic nature to be. He knows better than to attempt to alter the present open grate, or to forbid its employment; but he suggests that steps may be taken to render its use less frequent, and at the same time increase the comfort of the house. His idea is to place a stove in the basement, and thereby send a liberal supply of fresh warmed air all over the building. He cites his experience of a London house kept warm by a coke or anthracite stove throughout the winter for an expenditure on fuel of £3, "while in neighbouring houses of the same size the "coal bill was not less than £25." In this house, no coal at all was kept for five or six years. "Coke or anthracite "was used in the stove; the cooking and extra warming "in some of the rooms was done by gas." The best course for Mr. Fletcher to follow would be to make this experience better known than it is likely to be if confined to his Blue Book. We would ask him to consider the case of the new London which is being built at the present day —the houses of vast size and handsome appearance, and replete with every convenience except a system of rational warming. He should lecture to the architects, and so bring them to a sense of the duty that lies upon them of trying to prevent the new London from being actually smokier and smuttier than the old one.

The Attitude of Trades Unions towards Labour-Saving Appliances.

It has hardly yet been perceived by the self-styled Progressives of our latter-day municipal and national political parties who have ostentatiously allied themselves with the Trade Unionists, that a cardinal point of the policy of the latter is the negation of advancement, by any mechanical means, of the industries which they seek to control. It is a delusion, sedulously fostered and spread abroad by Trade Unionist wire-pullers, that the opposition which employers everywhere offer to their attempts to dominate industry is directed to the standard of wages or hours of labour which they insist upon. So far from this being true, it has been shown over and over again that employers are willing to pay their workpeople far more than Union rules would permit them to earn; and this constitutes the workman's interest in the preservation of the freedom of labour. We have repeatedly argued in these columns that, while British industry can stand Trade Union rates of pay and length of working hours, it would be ruined by the supremacy of the "Union stroke." Where the Trade Union principles are equally inimical to the life of industry, is in respect of their deliberate opposition to all mechanical improvement. Here the self-opinionated Trade Union leader is as "reactionary" as any frame-burner or threshing machine wrecker of what he himself would regard as the Dark Ages. He will have no better machines than those he uses himself; and he treats every labour-saving appliance as his mortal enemy. A good illustration of this suicidal short-sightedness is afforded by the course of development of the well-known "Linotype" composing-machine. At the recent annual general meeting of the Company which owns this remarkable invention for saving labour in type-setting, it was stated from the chair that the Company "tried the policy of conciliation for five or "six years with the Trade Unionists, who did not meet "the Company in a corresponding spirit." The organized compositors, hearing of a machine for enabling one man to set type as fast as six could do the work by hand, would have nothing to do with the invention. Since the compositors would not work with the Linotype Company, there was nothing for it but that the Company should dispense with the compositors. Accordingly, a training school was started, and operators sent out to work the new machines. "The result of the action which the "Directors had felt obliged to take was that they had an "efficient supply of labour, and were able to supply any "newspaper owner or printer in London with trained "compositors." This announcement cannot have been pleasant reading for the defeated printers, who will find little comfort in the further statement that "the Directors "intended to deal fairly with the various bodies interested; "but they did not mean to submit to any nonsense as to "rates of wages." So the mechanical world wags on; and organized labour can only help itself by joining in the movement.

WATER AND SANITARY AFFAIRS.

Mr. Cripps, the Parliamentary Agent of the London County Council, in the evidence which he gave last week before the Hybrid Committee of the House of Commons on the subject of the Transfer Bills, showed still further the essentially hostile attitude of the Council towards the Water Companies. He admitted that the effect of these Bills, if passed, would be to depreciate the value of the undertakings prior to purchase. Mr. Cripps might have acknowledged that this was the object of the Council when they gave instructions as to the framing of these Bills; for we may presume that he was the active agent and adviser in the matter, in accordance with his reputation as the author of a volume on "The Position of the "London Water Companies, considered from a Parlia-"mentary and Legal Point of View." Mr. Cripps assigns to the Metropolitan Water Companies the lowest possible position as to statutory rights; and it would seem, from his "point of view," as if they had little more than a permissive kind of existence. In his evidence the other day, he told the Committee that in 1852 the Companies had to face the alternative of "extinction," or acquiring powers to take water from other sources than those which were in use at that date. According to Mr. Cripps, the Companies preferred coming to Parliament for further powers; and, as a result, they promoted several "competing Bills." A similar statement is made by Mr. Cripps in the book already mentioned; and it is intended to menace the Companies with "extermination" should the supply they give be at any time "liable to suspicion as a potable "water." But the water supply of the Metropolis, according to the last annual report from Dr. Frankland, is not liable to any such suspicion; and consequently Mr. Cripps's argument on this point has no relation to the present order of things. Hence the position of the Metropolitan Water Companies does not depend on any such brittle thread as Mr. Cripps asserts. The crisis of 1852 was properly met; and the character of the water supply has undergone what may be fairly called "progressive" improvement from that time onward. Even Mr. Cripps cannot undertake to prove that the Water Companies have failed to fulfil the obligations they assumed when the Act of 1852 was passed, unless it be that, in his opinion, they ought not to charge the maximum rates then allowed. The Act of 1871, imposing certain provisions as to a constant supply and the appointment of a Water Examiner, was a further step, which, so far from weakening the position of the Water Companies, served to strengthen it, by giving additional guarantees to the consumers in respect to the quantity and quality of the supply.

But there is one respect in which Mr. Cripps is willing to allow that the Companies possess powers which they have hitherto failed to exercise, and which he would like to see brought into play. It is argued on this basis that one Company has a perfect right to invade the district of another, and to compete in giving a supply to the consumers. This we are told was the intention of Parliament; but it was defeated by the action of the Companies, in arranging that each one should have a territory of its own. We are given to understand that all this "districting" system is *ultra vires*. We certainly cannot congratulate the inhabitants of the Metropolis on the prospect of two Water Companies laying mains and service-pipes in

the same street. There is complaint enough at present as to one company tearing up the roadway. With two engaged in the same embarrassing enterprise, remonstrance would rise to indignation, and would compel the same wholesome restraint which was imposed on the Metropolitan Gas Companies when they were thirteen in number, and when in some cases nobody knew with certainty which main supplied a particular house with gas. But this idea of competition serves the purpose of the County Council. Mr. Cripps, under cross-examination by Mr. Bidder, admitted it as "within the "bounds of possibility" that the Council might elect not to purchase some of the undertakings. Mr. Bidder thereupon remarked: "You mean that the Council might "purchase only those Companies that would enable them "to set up competition with the others?" The answer is significant: "The Council would, no doubt, exercise all "the powers possessed by the purchased Companies." That is to say, the Council would exercise the latent powers of competition, presuming them to exist; the effect being not only to set up a "model supply" in one part of London, as a sample of what the Council could do everywhere if permitted, but to carry the supply into districts already occupied, in order to run down the value of the undertakings belonging to the Companies by whom those districts were served.

Now, we would ask: How far is such a proceeding as we have just described consistent with public honour and honesty? The scheme is not merely something which we suggest, but is actually shadowed forth, if not distinctly avowed, on behalf of the County Council. If it is not intended, let it be repudiated. It accords with the production of eight Bills, when one might have sufficed. But there is something with which it does not accord, and that is the grand leading idea of forthwith establishing one representative public authority to have charge of the water supply of the entire Metropolis. There is to be an intermediate stage, in which the water authority, backed by the public purse, is to settle down in a portion of London, and make that the basis of an attack on the remainder of the Metropolitan districts. The water supply of one part of London is to be in the hands of the County Council, and the remainder is to continue in the possession of the Companies, until the latter are brought to yield as to a besieging force, and capitulate on such terms as they may happen to obtain. Supposing the result of the present inquiry to go no farther than to divide the London Water Supply between the Council and the Companies, there would be a distinct departure from the principle laid down by Sir Matthew White Ridley's Committee—formally espoused by Mr. Plunket on behalf of the present Committee at the commencement of their proceedings. That the eight Transfer Bills should stand or fall together, is the only reasonable conclusion; and none other can be said to agree with past decisions of Parliament.

Mr. Cripps is decidedly the most interesting witness that has yet appeared before Mr. Plunket's Committee. His cross-examination came to a close on Thursday last—being the fourth day of his appearance. As justifying the transfer of the water undertakings before the completion of purchase, Mr. Cripps stated that it might require considerable time before the actual sum to be paid for the undertakings could be ascertained; and unless power were taken in the Bills to carry out the transfer before effecting the purchase, the existing chaos and confusion in regard to the water supply could not be promptly terminated. Chaos and confusion, we may observe, does not exist at present, but must arise if the works are transferred before the price is settled. There was something so amiable in the tone of Mr. Cripps's remarks concerning the debenture-holders, that at first we were at a loss to understand it. Thus he said that the promoters of the Transfer Bills were willing to make the debenture-holders secure "in any way "that was agreeable to the Companies." A little later on, the cause of this complaisance became apparent. It was hoped, said Mr. Cripps, that the Companies would agree with the County Council, so as to facilitate the passage of the Council's Money Bill, and, consequently, the payment of the Companies for their undertakings. In this respect, the Council would fain have the help of the Companies. "Payment" is pleasantly alluded to; and Mr. Cripps, earlier in the day, even gave consideration to the fact that the market value of the undertakings might be taken at between 30 and 35 millions sterling. He promised to prepare tables showing the effect on the rates, supposing the Companies received this amount in the purchase of their property. Mr. Costelloe, in an article which he has contributed to the June number of the *Contemporary Review*, says that, even if the London Water Companies were bought up at what he considers the extravagant rate of thirty years' purchase of a net divisible profit of over a million sterling per annum, the bargain would be profitable to the ratepayer. Correct as to the public advantage that would accrue from such a purchase, Mr. Costelloe nevertheless blunders by saying that the present supply is inadequately filtered, is intermittent, and was intended by Parliament to be carried out on the competitive system. We are surprised to find that this gentleman knows so little of a subject on which he discourses as an oracle.

While Mr. Cripps made many striking statements before the Hybrid Committee, Mr. Fletcher Moulton's evidence on Friday, relative to the conditions of the arbitration clause, proved the most critical, especially in cross-examination by Mr. Pember. At the termination of this stage, the Committee, after a prolonged deliberation in private, announced that at their next sitting, on June 12, they would hear the arguments of Counsel on the points raised by Mr. Fletcher Moulton, before taking further evidence. This is thought likely to prove fatal to the arbitration clause; and should the clause be rejected, it is sufficiently certain that the Transfer Bills will be withdrawn.

It is always humiliating for zealous agitators to have to confess that they have no case, and subside into retirement and obscurity; and it was perhaps hardly to be expected that the aggrieved consumers who are now asking some of the Water Companies for partial remission of their water-rates would be content to drop the agitation without some further show of pugnacity. The Secretaries of the Lambeth and Grand Junction Water Companies respectively have sent a moderately-worded reply to the memorialists; and the purport of their communications will be found in last week's JOURNAL. But these vicariously dissatisfied gentlemen are bent on having the law, the whole law, and nothing but the law. To the law, therefore, they must go. Life and litigation are full of surprises; so that it would be rash to predict the precise outcome of the threatened campaign. But it may be safely said that if the *ratio decidendi* which governed the cases noticed in recent issues of the JOURNAL (including the magisterial ruling at Reading, commented upon last week) should be consistently observed, legal proceedings in regard to this question can but result in favour of the Companies. The memorialists start with an erroneous assumption, which in itself goes far to invalidate their own arguments. The Water Companies, it should be understood, are under no obligation to deliver water into a consumer's house. The statute simply requires them to keep the mains charged with water, except when prevented by certain causes of which, as the Companies reasonably urge, the recent exceptional frost may be legally regarded as one. The malcontents, however, refuse to hearken to the voice of reason. Not content with branding the Companies as extortioners, they want to be paid for the trouble of helping themselves to the emergency supply, which during the frost the Companies brought within their reach. They ignore, too, the whole principle by which water-rates are regulated. The consumer of water required for domestic purposes does not get his supply by meter; so that the suggestion that the Company has sold, and been paid for, something which has not been delivered, is utterly fallacious. For a fixed annual payment, the consumer may use as much water as he can get. If through exceptional causes, beyond the control of the suppliers, a householder cannot get out of the mains the water which has been sent there to be tapped, he is entitled to grumble at elemental forces; but it is simply puerile to try to shift the blame on to the shoulders of the Water Companies.

To use hospitality without grudging is a good and gracious thing, always provided you are not hospitable at other people's expense. This, however, is a proviso to which the municipal mind has not invariably paid due heed. Little difficulties have from time to time arisen with those whose duty it is to audit the accounts of corporate bodies—difficulties of a class experienced by both the Glasgow and Edinburgh Water Commissioners and alluded to in our "Notes from Scotland" last week. It is

well to bear these incidents in mind for the behoof of those English Corporations that own, or seek to own, local water undertakings, as well as with an eye to the future powers of the London County Council or other public authority to which, in the dim and distant future, the control of the Metropolitan Water Supply may possibly be entrusted. Sir James Marwick, the Town Clerk of Glasgow, has been publicly counselling his Commissioners concerning this question, which is rather vaguely described as the "cost of inspection of water-works." Sir James had in mind a legal decision given by an authoritative tribunal in Ireland as affecting the Dublin Water Commission; and he very justly pointed out that what is law for Ireland in this matter is law for Scotland—and we doubt not for England also. The principle is that where a public body of men are acting as trustees pursuant to an Act of Parliament, they can only receive the protection of the law when they exercise strictly the powers which the statute has conferred upon them. In other words, you must not spend trust funds for purposes other than those duly sanctioned by the Act of Parliament. The "expenses of feasting, or anything of that description," must be rigorously excluded. It may seem hard; but there, undoubtedly, is the law. In Glasgow, for example, the whole Town Council are Water Commissioners, and consequently are theoretically bound to have an eye to the water-works. Whether so many eyes can be advantageously employed for the purpose, is another question. But even if the eye be engaged in "inspecting," the mouth must not be occupied with "feasting or anything "of that description," unless the owner of those features provides the wherewithal at his own expense. The Town Clerk of Glasgow thinks it is right the Council should visit the works and receive their travelling expenses. He even concedes the fitness and legality of these gentlemen having reasonable and moderate refreshment while engaged on this important duty. But the line is to be drawn at "feasting." The "wasteful extravagance"—possibly going even to the length of champagne and choice cigars—which had been disallowed in Ireland must also be excluded in Scotland. This, doubtless, is sound doctrine discreetly expressed. "But what about the guests?" asked one of the Town Clerk's hearers. And to him Sir James Marwick made reply, that he was afraid the expenses of guests could not be charged against the trust funds, and that gentlemen who invited guests must make provision for them. This is a hard saying, but necessary. It is to be feared that some of those to whom Sir James addressed himself must have gone away very sorrowful; for, as we have hinted, the pleasures of vicarious hospitality constitute for some people by far the more excellent way.

Dr. E. Frankland, F.R.S., who is a Correspondent of the Paris Academy of Sciences, has been elected Foreign Associate, in the place of the late Professor Van Beneden.

Mr. Walter Higginson, Manager of the Crossgates Gas Company, has been appointed, out of 107 applicants, Manager of the Sandbach Gas Company, in place of Mr. T. Davies, who has been appointed Manager of the Llandudno Gas-Works, in succession to Mr. A. H. Smith.

Proposed Statue to Lavoisier.—The Institute of France has decided to solicit subscriptions for the erection of a statue to Lavoisier in Paris. It is intended to make the appeal an international one, so that all admirers of Lavoisier may do honour to the memory of one of the creators of modern science.

Death of Mr. S. H. M. Davy, F.C.S.—We regret to announce the death, on the 28th ult., after a short illness, of Mr. S. H. M. Davy, F.C.S., who had filled the position of Chemist and Gas Examiner to the Sheffield Gas Company during the past six years. Previous to going to Sheffield, deceased was at the Manchester Gas-Works, under the late Dr. John Leigh. His early death, at the age of 33, removes one whose excellent qualities of character and great professional abilities obtained the esteem and admiration of all with whom he was acquainted.

Increases in Salaries.—At the meeting of the London County Council last Tuesday, the salary of the Chemist and Superintending Gas Examiner (Mr. W. J. Dibdin, F.I.C., F.C.S.) was raised by the sum of £100. The General Purposes Committee had recommended an advance of £300, by two annual increments, considering the importance of the office filled by Mr. Dibdin, and the large amount of work, outside his official duties, yet closely connected with them, which he has lately performed, especially in regard to the proposed new standard of light. But the recommendation was rejected. At the last meeting of the Slough Gas Company, the Directors decided to increase the salary of the Manager (Mr. T. C. Webb).

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1209.)

In a week such as that just closed—which embraced within its limits the Derby and Oaks, two Jewish holidays, and a closed Saturday, to say nothing of a Whitsuntide to follow—any great demonstration of activity was scarcely to be expected. Besides, the speculative world was inclined to take a rest after the turmoil of the settlement last concluded. Thus the markets in general wore an air of repose. They also ruled dullish, not so much in consequence of new apprehensions, but rather from a wide disposition to meet the holidays with closed accounts and a light heart. Prices accordingly have drooped to a slight extent; but if there is any good ground for the expectation of a great revival of enterprise and activity upon the reopening, it will not take long for them to mend. The Gas Market has, of course, chalked out its own line, and has really been pretty active, in spite of all the deterrent factors referred to. Quotations have gone steadily on the rise. Those which in the preceding week were foremost in the advance have made further progress; and one or two others have joined in the procession. In Gaslights, the "A" opened strong at 274½, and crept slowly but steadily up, with a pretty amount of business every day. It touched 277; the quotation being one point up. Very little business was done in the secured issues; but everything that was dealt in commanded nice figures. South Metropolitans were in similar case. The "A" was repeatedly done at the highest quoted figure; and the "B" at only one point lower. It is not unlikely that, before the next account is closed, the latter stock will beat a 4 per cent. price. Commercials were quiet, and were left still unchanged—the cheapest choice stock in the market. The Suburbans and Provincials are still going up gaily; British and Bromley being again in the van. Of the Continentals, Union and European were little dealt in. But there was a good run on Imperial; and the quotation rose the first three days steadily, though the last prices were not the best of the week. Among the rest, only Buenos Ayres was conspicuous with a further advance. The Water Companies were stronger; and changes, though slight, are in the upward direction.

The daily operations were: Gas was fairly active on Monday, and very strong. Gaslight "A" and Imperial Continental rose 1 each. East London water recoved 2. Activity and firmness continued on Tuesday. Imperial Continental advanced 2; and British and both Bromleys, 1½ each. Wednesday also was pretty active; and Imperial Continental pushed up another point. Southwark Water rose 1. Business was beginning to flag on Thursday; but prices were capital. Buenos Ayres gained ¼. Friday was quiet, and without any particular feature, beyond a recovery of 1 in Lambeth Water.

ELECTRIC LIGHTING MEMORANDA.

Electric Lighting Experiences at Kingston-upon-Thames—Promise and Fulfilment—A Novel "Feeler" Proposal.

An instructive tale of municipal experience in regard to electric lighting comes from the borough of Kingston-upon-Thames. The first report on the working of the central station has just been issued by Mr. J. E. Edgcome, the Borough Electrical Engineer, and gives a concise account of the system and its results, so far as these have been ascertained for the period from October, 1893, to the end of last year. The revenue account shows a deficit balance of £1298; but it is pointed out that as the amount receivable for current for the last March quarter is about £470, which is more than double the receipts for the corresponding quarter of last year, the present outlook is "very promising." It would be easier to see the matter in this light if the facts did not happen to be that the receipts for the December quarter were £485, or something more than the returns for the later and usually heavier quarter. This looks as if the bulk of the requirements of the borough in the matter of electric light have already been satisfied, which is not surprising, as the "saturation-point" for electricity of these small towns is soon reached. Upon this basis, and assuming that, as in the case of gas supply, the annual consumption is about three times that for the heaviest winter quarter, the Kingston Corporation will have to make the best they can of a private rental of about £1500 a year, supplemented with a subsidy of another £1000 for the lighting of the public streets and buildings. As the Engineer observes in his report, the whole question of profit earning in an undertaking of this kind is merely one of sufficient demand. But unless Kingston can take double the quantity of electricity that appears to satisfy the town for the present, there is small prospect of the undertaking ceasing to be a considerable burden upon the rates.

Kingston is one of Mr. W. H. Preece's triumphs. It is instructive to make a brief comparison of promise and fulfilment in this instance. Speaking in the Town Council meeting on Jan. 5, 1893, upon the motion to advertise for tenders as advised by Mr. Preece, Mr. Collings said upon this authority that the undertaking would "prove a successful speculation in three

years, and after that a profitable one." And he also declared, in reply to an inquiry, that "no such thing as a 3d. rate would be required." At a meeting of the Town Council on the 2nd of March following, the same speaker, in moving the acceptance of tenders for the work, declared that if there was any risk of a burden being thrown upon the rates, he should object to the electric lighting scheme. Now, two years later, the borough has got its additional threepenny lighting rate, while the prospect of the undertaking paying expenses is still remote. When the affair was started, the Mayor assured a public meeting that the cost of the street arc lamps would be £12 per annum. The charge is actually £20, and ought to be half as much again. The local newspaper recently observed that "the whole of the capital charges have not yet come into account;" and it appears that £7772 more has to be borrowed—the original capital loan of £16,000 having been exceeded by £2550 before the works were completed. Altogether, there is no doubt about the fact that Kingston will have for many years to come to pay smartly for the illusion to which the Local Authority fell an easy victim in 1893. The Local Government Board are, at any rate, under no illusion as to the state of the case; and they will only sanction the borrowing of the further capital sum required for the undertaking on condition that it be repaid in 15 years. It is just as well the present generation of Kingston ratepayers should be made to feel the effects of their mistake.

For the solace of such venturesome local authorities as those of Kingston, our contemporary the *Electrical Review* has recently suggested a notable plan for the lighting by electricity of outlying places by means of current supplied from central stations that happen to be overweighted by establishment charges and embarrassed by plant for which they cannot find sufficient employment near home. We agree with our contemporary that what is wanted in this connection is "a moderate capital expenditure, a simple and efficient plant, a good and constant supply, reasonable managerial expenses, strict economy in working, and a popular price per Board of Trade unit." Not much to desire, it may be remarked in parenthesis; but is it not said by the poet that "man wants but little here below"—and does not every-day experience show that even this little is hard to get? Well, our esteemed contemporary thinks it can show how the man who wants a little electricity, in a little place, at a little cost, which shall nevertheless return a little profit to the supplier, might be easily gratified. It is only to provide an arrangement of "feelers," to be thrown out by central stations to surrounding towns at distances varying from two to twenty miles, preferably "small market towns, where the supply of gas is bad, and the price high." It is hopefully thought of such places that "the inhabitants would welcome the electric light, and many would gladly invest a considerable amount of money in laying down an electric light plant if it could be shown to be a sound commercial undertaking." Alas! there's the rub. Of course, in the editorial columns of our contemporary it can be shown easily enough that any "one man and a boy" type of electric lighting plant could be depended upon to return a dividend of 7½ per cent., or thereabouts, on its capital cost. But, as the song says, "it's a game that's been played before." We should perhaps apologize for speaking thus flippantly of a really imposing calculation; but there is no better way of awakening in the mind of the average man a sense of the ludicrousness, at this time of day, of these electricians' forecasts of working expenses and profits. It is idle to expect the readers of technical periodicals to peruse with a sober visage computations starting with the assumption that electricity can be generated for the supply of small market towns at a cost of 2¾d. per unit, while the general public only know that the prophecies of electric lighting experts, whatever their bases, have invariably exhibited themselves in the light of experience as the most deplorably misleading efforts in the way of vaticination that were ever offered to the attention of a confiding community. Seriously, it is high time that electricians one and all should bind themselves by a self-denying ordinance never to prophesy henceforward until after the event. Flights of imagination of the kind are perilous enough even when the conditions are to an extent known, and the field of possible realization is defined; but it is a worse thing when the attempt is made to persuade the inhabitants of "small market towns" generally to believe for a moment that, where gas cannot be made as cheap and good as it can be obtained in large centres of population, there is an opening for the profitable employment of money in the supply of electric lighting.

Gas Cylinders.—The Secretary of State for the Home Department has requested the following gentlemen to inquire into, and report upon, the manufacture, filling, and use of gas cylinders—viz., Professor C. V. Boys, Professor Harold B. Dixon, Dr. A. Dupré, the Rev. F. J. Smith, and Professor W. C. Unwin. Mr. R. F. Reynard, of the Home Office, will fill the position of Secretary to these gentlemen.

The Institution of Gas Engineers.—Our report of the proceedings at the recent meeting of the Institution is now complete, with the exception of the paper read by Mr. F. D. Marshall, of Copenhagen. This is only waiting for the preparation of the diagrams necessary for the comprehension of the paper; and as soon as these are ready, we shall give it, with the appendix and the discussion.

"SLOPERS" AT BRENTFORD.

Such a high degree of general interest, albeit not of the kind that comes from agreement with the author, was aroused at the recent meeting of the Institution of Gas Engineers by Mr. J. Husband's paper on "Sloping Retorts," given in the Journal for the 21st ult., that we judged it due to the much-criticized author to accept his invitation to inspect the latest examples of this system of coal carbonization at Brentford; and accordingly a visit, of which we now purpose giving a true and particular account, was paid to this headquarters of the system in question on Monday of last week, with the object of presenting to our readers an independent statement of the facts upon which the paper was professedly based. It is only fair to Mr. Husband, who is Engineer in charge of the Brentford station under Mr. Frank Morris, Engineer to the Brentford Gas Company, to make it clear at the outset that every gas manager interested in the subject of sloping retorts—and who among them is not?—is as welcome as we were made, to go to Brentford whenever he pleases, as often as he likes, and to stay as long as he feels disposed, with no longer notice of his intention than the common rules of courtesy require as between any host and visitor. It is necessary to state this, inasmuch as there undoubtedly is an impression among the members of the gas engineering profession that persons identified with special proprietary systems of carbonizing, and particularly with the principle of inclined retorts, have not always been as candid as they might have been with regard to the performances of their "fancy." We say nothing about the existence or absence of grounds for this suspicion; but we do say, and make the assertion with all the emphasis at our command, that, so far as Mr. Husband is concerned, whatever may be his quality as a writer of technical papers—and he has the faults as well as the zeal of a young author—he is, to the best of our observation and belief, incapable of practising such deception either upon himself or upon others as that of which certain of his Institution critics seemed disposed to suspect him. We are not at all concerned to support the paper, which may be as loosely put together and stuffed with figures as carelessly or uncritically chosen as ever was contribution to the literature of a debateable point of technics. But we have witnessed what is being done at Brentford; and the significance of the facts is not to be denied. For some years, sloping retorts have been upon their trial at this station; and at the present time there is not a horizontal retort in use there. Last winter, some gas was still made at Brentford in horizontal retorts. Next winter, however, all retorts will be "slopers;" and when Mr. Husband next brings the subject before the Institution—as it will be his duty to do a twelvemonth hence—he will be able to state his data without the necessity, always liable to arouse suspicion, of picking them out from a mass of irrelevant matter. There will be no gainsaying returns extracted from a station carbonizing book containing nothing but figures relevant to the point at issue.

The first thing we have to lay stress upon is this, of the actual extension of the sloping settings at Brentford, to the exclusion of other kinds. Where else is there any similar condition of affairs? It seems a bold thing, and one that does not redound to the credit either of the principle or to those who have experimented with it, to say that while in most places inclined retort systems have but attained to the qualified repute of being only not quite a failure, at Brentford alone are "slopers" an unqualified success. But there is nothing else to be said that meets the case. At many works, single benches and sets of benches of sloping retorts have been erected; but in the majority of instances the system has failed to take root and grow. Only in the works of the Brentford Gas Company, as we believe, has the system hitherto "survived," in the full sense of the term as used by Evolutionists. It is not for us to explain the circumstance, which is strange enough, even if it turns out that Brentford is not unique in this regard. Let us proceed to record the facts as they appear at this place of favourable environment for the "slopers."

Two houses are filled with sloping retorts; both being situated end-on to the river and coal wharf, and in all essentials similar. The first, called the "Old House," contains settings of retorts of different ages and various angles of inclination and other diversities incidental to a period of experiment. These experimental settings proved several things. They showed the best angle of inclination, and disclosed other facts which have been made use of in later work. One of the most striking of these pieces of evidence remains—the durability of retorts set sloping in accordance with Mr. Husband's plans. Two settings may be seen in work here, which have been in operation for 800 days, the others having worked 540 days; and to all appearance one setting is in as good a state as another. The alignment of the old retorts is yet perfect, and although the experimental angle of 30° is not steep enough to enable a long, light rake to be dispensed with in the draw, there is no sign that the retorts have been subjected to exceptional wear or knocking about.

The "New House" is a perfect object-lesson in its way. So cool, and with lids so tight as to cheat an observer into inquiring whether it is actually in use, this is the last and best expression in England of the inclined retort system with regenerative firing. It was started in work at the end of last November; and since then it has enabled coal to be carbonized at a cost

for wages only of about 1s. per ton. This result is, of course, due to the great weight of coal which the working staff are able to deal with. There are eight settings of 24½-inch Ω retorts, 20 feet long, set in sixes at a slope of 31°; the arches being 7 feet 5 in. span. The ascension-pipes are only 6 inches in diameter, rising from the front or discharging mouthpieces, and there are 6-inch "anti-dips" connecting with a foul-gas main carried in front of the setting. By this arrangement, a shortened ascension-pipe is secured, with no trouble from stopped pipes. A level gauge is kept on the mouthpieces, which means a tenth or so of pressure at the upper end of the retorts when the gas is coming off most freely. The charge averages 7¼ cwt. of "through and through" Ravensworth Pelaw and Deafhill coal, with a dash of cannel occasionally. The furnaces, one to every arch, are a plain kind of regenerator, built without special tiles or pipes for the air passages; and the heats are by no means high, though all that can be desired in respect of regularity and uniformity. The absence of anything like the roasting effect of radiation from the settings is a proof of the existence of the best of working conditions, which is also shown by the good preservation of the face of the work.

Both houses are worked by the same set of five stokers, with whom are associated a pipe-jumper, a fireman, and a boy to assist at the fires. The retorts are taken in pairs, from top to bottom—32 constituting a draw. Our inspection on Monday began by seeing at midday the lower lids opened of three retorts charged at 10 o'clock. This was to show that hardly any tar accumulates in the mouthpiece; and the demonstration was quite satisfactory. Speaking now of the New House, the lids for the noon draw, which were the middle pairs, were started off at 11.55. At 11.57½ all the 16 lids were open, the valves of the anti-dips closed, the slight dripping from the open mouthpieces over, and the draw commenced by one man pulling out the "stops" from the retorts. Previous to this being done, we walked along the stage and looked up through every retort—noting that they were all full of coke almost to the crowns; the charge being perfectly, but not excessively, worked off, and lying in a level slope from end to end of the retort, so far as the eye could "bone" it. When the stop was removed, sometimes the coke followed without further inducement; but in every other case a prick with a short hand-rod was enough to start it. There was no labour whatever about this performance. Only two stokers remained on the stage at this period; and the first half of the draw was over by 12 o'clock. Then there was a brief pause, while two of the gang in the vault below were engaged in cooling and throwing back the coke; and upon resumption all the retorts were emptied in another two minutes. Charging then began—one man being on the top for this work. Ten retorts were charged by 12.8, when a pause for inspection was called; and we had the novel experience of standing and looking up through three retorts in succession while the coal was being shot down from above. Only a few small bits escaped the "stops;" and it was striking to see how the hot sole of the retort seemed to catch hold of the coal as soon as it came to rest, when, of course, the flame and smoke quickly hid the contents from view. Lastly, we gratified the devoted foreman by proceeding to the charging end; noting how the shoot, fitted with Mr. Husband's "check," distributed the charge, and assisted to complete the demonstration of the ease and simplicity of the whole process by charging a couple of retorts ourselves. With all these interruptions, including the instruction to the "new hand," the work was done by 12.13. Mr. Husband's "check" is now developed into a simple roller placed in a slot in the bottom of the shoot, and capable of being made more or less prominent to suit the physical characteristic of the coal. All sorts and descriptions of coals have been dealt with at Brentford, without presenting any difficulty in securing the desired evenness of distribution. Three-quarters of an hour later, we saw three retorts opened, including those we personally charged, and found the charge level and the mouthpieces practically dry. The work of the pipe-jumper, whose official designation sounds formidable enough, is, we are assured, limited to what we saw him doing on this occasion—driving the auger through the thin film of carbon which accumulates in the throat of the ascension-pipe.

All this we saw, and nothing could be more satisfactory than the whole thing. If this is how "slopers" work, there is still some ground for the prognostication that they will increase and spread over the land before many years have passed away. Upon the remaining points of sperm value, fuel consumption, and so forth, we cannot say anything new, because we made no test. But we saw Mr. Husband's carbonizing book; and we can aver there is no gainsaying his coke sales. To conclude the whole matter, we can but advise all and sundry of our readers interested in the subject to follow our example, and go and see Mr. Husband at home.

The Price of Calcium Carbide.—Referring to the paragraph, in the last issue of the JOURNAL, on the subject of producing acetylene gas, in which the very high figure of £20 per pound was mentioned for calcium carbide, and even 2s. per pound was spoken of as making the production of the gas for bicycle riding a "somewhat expensive luxury," we learn that Messrs. Domeier and Co., No. 13, St. Mary-at-Hill, E.C., are prepared to supply the carbide in 2-lb. tins, at 2s. per tin, or 1s. per lb.

NOTES.

French Gas Power Plant.

Particulars were recently published in *Industries and Iron* of an interesting French power generating and transmission plant in which gas-engines are employed. The example is worthy of notice, as a further proof of the growing popularity with French mechanical engineers and power-users of this method of employing the coal of the country, which, though an inferior fuel for direct grate burning, seems to be as suitable as any other for gasifying in a producer. The plant in question is established at the chemical manufactory of M. Paul Livet at Aubervilliers (Seine). These works have been extended from time to time, until they now cover such a large area that it has been deemed necessary to remodel the motive-power arrangements. Not only was it found too costly to extend the ordinary methods of driving machinery over the whole of the works, but the operations to be performed make so much dust that the repairs to the moving parts would be very heavy. It was therefore ultimately decided to put down an electric power plant with a view to doing away with a large quantity of shafting, and also to obtaining a higher degree of efficiency than was realized with the old system of driving. The prime movers in the system are three of Matter and Co.'s "Simplex" gas-engines, supplied with gas generated by a pair of Buire-Lencauchez producers. The gas is scrubbed, metered, and passed through a purifier into a relief holder. At a trial of the producers, conducted by Captain Leneveu and M. Livet, the consumption of coal was thus determined: The engine was first run for a sufficient time to get up its normal working temperature. The producer was then cleaned out, and filled with a fresh charge of coal, including what was fit to burn from the old charge. Further supplies of coal were weighed. The producer was again cleaned out at the close of the trial, and the unconsumed quantity accounted for. It appeared from the results of the test that the consumption of coal was 1·45 lbs. per brake horse power, and 1·117 lbs. per indicated horse power for one of the engines in question, and 1·07 lbs. per indicated horse power for two engines, which together worked up to about 110 indicated horse power.

Gas-Works Tramways.

A valuable paper on portable railways for works and factories was recently read by Mr. J. Walwyn White before the Liverpool Section of the Society of Chemical Industry, and is published in the Society's *Journal*. With reference to coal traffic, the author mentioned an example of an arrangement adapted to a narrow-gauge tramway, near York, for carrying coal to a small gas-works. The gauge of the line is 2 ft. 6 in. The waggons have steel frames carrying the wheels and axles, &c.; and at each end of the frame or bogie is a standard high enough to carry the tipping trunnions, which are mounted on the wooden boxes carrying the coal. These boxes are about 4 ft. 10 in. long, 3 ft. 8 in. wide, and 3 feet deep, carrying about two cubic yards of coal; and they are so made that six boxes exactly fit into an ordinary standard-gauge main-line waggon. This main-line waggon, with its six empty tipping-boxes, goes to the colliery, where the boxes are all filled with coal in the ordinary way, and is then delivered to the terminus of the narrow-gauge railway. Here each box is lifted out of the main-line waggon by means of a light portable crane, and deposited upon the bogie frame standing on the narrow-gauge railway; and the six empty boxes from the bogies are put into the main-line waggon, and returned to the colliery for a fresh load. The full boxes are then run along the narrow-gauge railway to the gas-works, and tipped by means of the trunnions provided for the purpose (by which they are suspended in the bogie frames) direct into the store at the works or alongside the retorts. Thus there is actually no break of bulk from the colliery right to the mouth of the retorts. For traction, Mr. White speaks favourably of gas-engines, which are doing very well at Dessau for passenger traffic, where the running cost is only 0·8d. per car-mile with gas at 4s. per 1000 cubic feet. He says he shall look with interest on the further development of this kind of traction. It is certainly highly disappointing that nothing is heard of gas traction in connection with working English gas-works and colliery tramways.

Points of Thermo-Dynamics.

Lecturing before the Liverpool Engineering Society, Professor Oliver J. Lodge stated, by way of a practical outcome from his study of the laws of thermo-dynamics, that, since these laws assert (1) that when work is done by a working substance in a heat-engine a portion of its heat is consumed and utilized, and (2) that the portion thus utilized is immediately dependent on the temperature of the working substance, it follows that a substance suitable for use in a heat-engine must have two qualities: (*a*) It must have a great capacity for heat, so as to store and carry with it a great quantity of energy: (*b*) It must be able to stand a high temperature. Air and permanent gases satisfy the latter condition admirably; but not the former. There is no limit to the temperature to which they may be raised; but their capacity for heat is small. In order, therefore, to get very much work out of a hot-air engine, it must be unwieldy in size, or else it must be worked at a bursting pressure such as

is suitable for a cannon. Saturated vapour has a far more concentrated capacity for heat; and this is the most valuable property of steam—that it is able to contain an immense amount of energy in a small mass of material. Hence steam-engines can be moderate in size and yet powerful. Its main defect is that its boiling-point is so low that it will not stand a high temperature without an altogether exorbitant and impracticable pressure. What is wanted is a substance equally or more expansible, but capable of being made much hotter while its pressure is still within moderate bounds. Hence the radical defect of the steam-motor, which consists in the fact that the high temperature of the furnace is ignored and thrown away. The great drop of temperature between furnace and boiler is unutilized. So cold are the sides of a boiler furnace, that they put out the flame of the fuel, which never touches them. Either a high-temperature working substance, or some form of internal combustion engine where no conduction of heat is needed, seems to be the direction in which theory points for the improvement of the motor. The *Engineer* criticizes Professor Lodge's contention that the heat-capacity of steam is a valuable quality, seeing that, owing to the latent heat of steam being so high, out of 100 tons of coal burnt in driving a condensing steam-engine, 85 tons go in throwing hot water away. There is no such source of loss as this in connection with either the hot-air or the gas engine.

A Gas Thermo-Electric Battery.

Great things are reported in the *Electrical Engineer* of New York as to the performance of the Cox thermo-electric battery. This is an appliance for directly converting into electrical energy, upon well-known principles, the heat of burning illuminating gas. Hitherto thermo-electric generators have suffered from various practical drawbacks which rendered them more curious than useful. Oxidation took place at the junctions of the couples; causing disintegration and collapse of the battery. This is prevented in the Cox apparatus by making the junctions by means of a graduated alloy of the two metals or the alloys forming the couples. To prevent any oxidation, the completed element is enclosed in a vitrified cement casing. The whole arrangement is in the shape of a cylinder, in the interior of which the gas burns, while outside there is a circulating water-jacket to keep the temperature within safe limits. The generator rings the changes between quantity and pressure of electricity for the same gas consumption. Thus for a consumption of 2½ cubic feet of gas per hour, one may have almost anything from ½ volt and 90 ampères to 11 volts and 4 ampères. Taking these figures, the *Electrical Review* calculates that 18 Board of Trade units can be obtained by the consumption of 1000 cubic feet of gas, which with gas at 3s. per 1000 cubic feet makes the cost of the unit 2d. for fuel alone. It appears that the New York office of the Commercial Cable Company has operated its lines for several weeks with these generators; the consumption of gas being about 7 cubic feet per hour, and the saving upon the old battery system as 8 : 1. This is a new application for coal gas, which is at least interesting.

Nitrogen in Fuels.—The quantity of nitrogen in fuel ranges from 1 to 2 per cent., calculated on the combustible material. The percentage is, as a rule, smaller the older the fuel formation. The ammonia produced during dry distillation ranges from 0·17 to 0·58 gramme per 100 grammes of fuel; the quantity again being generally smaller the older the fuel formation. The ammonia produced generally represents from 13 to 24 per cent. of the nitrogen in the fuel; but with peat—*i.e.*, fuel of recent formation—the percentage rises to 35·7 of the nitrogen. When coke is treated at 800° to 900° with steam, as much as 85 per cent. of the nitrogen can be obtained as ammonia. This fact—it has been pointed out by Dr. L. T. Thorne—should be practically applicable in gas-works, or certainly in connection with coke-ovens; a current of steam being passed into the retorts before the removal of the coke.

Inverted Syphons on the Paris Drainage Works.—In the extension of the sewage-disposal works of Paris, it was designed to relieve the River Seine of all the pollution resulting from the turning into it of an amount of sewage estimated at 360,000 cubic yards daily. The additional works include a new pumping-station at Colombes, equipped with four groups of pumps, each of 300-horse power, which will lift the sewage 115 feet. These pumps deliver into four pipes 43·3 inches diameter, and made of steel plates. These pipes are carried across the Seine under the girders of a road-bridge. From this point to Herblay, opposite the new irrigation area, the sewage is conveyed in two iron mains 70·8 inches in diameter laid within a gallery or conduit of steel and cement concrete. At Herblay, the line is taken over the Seine by an inverted syphon, consisting of a double line of pipes 39·37 inches in diameter. These are built of steel plates 0·71 inch thick, are placed parallel to each other and 20 inches apart, and are connected at intervals of 10 feet by a braced framing. The total length of each pipe is 668 feet. The pipes are not laid horizontally, but are curved to follow the bed of the river. Before setting them in position, a trench 13 feet wide was excavated in the river bed, and a uniform bearing was made in the bottom of the trench with concrete. The double syphon complete weighed 259 tons.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Spring Meeting of this Association was held last Thursday at the Gas Offices, Coventry—the President (Mr. George Winstanley) in the chair. In the unavoidable absence of the Chairman of the Gas Committee (Mr. W. Andrews), a very cordial welcome to the city was accorded to the members by the Mayor, Alderman J. B. Loudon, who was accompanied by the Town Clerk and several of his colleagues on the Corporation. This compliment to the Association was suitably acknowledged by the members, on the motion of the Vice-President (Mr. W. R. Cooper, of Banbury), seconded by Mr. Peter Simpson. Mr. Meiklejohn, the Hon. Secretary, then read the minutes of the last meeting; and they were confirmed. The only remaining formal business consisted in the election of two new members—Mr. Thomas Glover, of West Bromwich, and Mr. J. Wilson, of Upton-on-Severn. Mr. Winstanley then, by the aid of a ground plan of the works, explained the general characteristics of the plant the members were about to inspect; also the system of manufacture carried out summer and winter—referring more especially to the difficulties encountered in arranging for any needed extensions, consequent on the cramped character of the site. An hour was then profitably employed going over the works, guided by Mr. Winstanley and his assistant. An excellent luncheon followed, on the invitation of the President; and then, after a brief delay, caused by a smart thunder-shower, the party were driven in brakes through Stoneleigh Deer Park to Kenilworth. During the inspection of the far-famed Castle ruins and walls, several photographic groups were taken as a memento of the day's excursion. An adjournment was afterwards made to the King's Arms Hotel, to a high tea—a very welcome provision by Mr. Winstanley after the heat of the afternoon and early evening. The splendid entertainment the members had enjoyed throughout the day at the hands of their President was suitably acknowledged; and a vote of thanks was also passed—on the motion of Mr. B. W. Smith, seconded by Mr. S. Meunier—to the Coventry Corporation for the interest they had shown in the welfare of the Association by the arrangements they had permitted Mr. Winstanley to make for the comfort of his guests during the morning. The vote was acknowledged by Mr. Kidner. Mr. Meiklejohn's efficient services were also duly recognized—on the motion of Mr. Simpson, seconded by Mr. J. T. Lewis, of Wellingborough. Another pleasant drive past scenery for which this part of Warwickshire is so justly celebrated, brought the party back to Coventry by a different route to that which was taken on the outward journey. A most enjoyable day was thus brought to a close.

INSTITUTION OF CIVIL ENGINEERS.

Annual Report—The New Council.

The Annual General Meeting of the Institution was held in the Hall of the Royal United Service Institution, Whitehall, last Tuesday—Sir R. Rawlinson, K.C.B., the President, in the chair. The report presented by the Council commenced by referring to the change that had taken place in the roll of the society in the past twelve months, during which 29 members, 286 associate members, and 5 associates were elected, and 2 members and 3 associate members were restored to the roll; while the deaths, resignations, and erasures amounted to 170. The net increase was therefore 155, or at the rate of nearly 3 per cent. per annum. The numbers of all classes on the books at the end of the Institution year were: Honorary members, 17; members, 1862; associate members, 3687; associates, 355—making a total of 5921. Attached to the Institution, though not forming part of it, is the student class, the conditions of admission to which have continued to exercise the earnest attention of the Council. For the first time since the introduction of the higher qualifications of candidates for admission as students, the Council were able to report an effective increase in the roll; the numbers on March 31, 1895, being 816, or 25 more than at the same date last year. The statement of accounts showed that the receipts of the year had been: On income account, £20,970; on capital account, £8933; and on trust funds account, £445—together, £30,348. The general expenditure amounted to £18,386; capital expenditure absorbed £7130, mainly on account of the new building; and trust funds expenditure, £492—together, £26,008. Owing to the necessity of delivering, in April, the meeting-room to the Contractors for the new building, the Institution met for the reading and discussion of papers on only twenty evenings during the past session. Exclusive of the President's address, fourteen original communications were read and discussed, for some of which awards of medals or premiums, or both, were made. As in the preceding session, eleven supplemental meetings for students were held, at which papers were read and discussed—some exhibiting sufficient merit to warrant their publication in the P[illegible]edings. The third of the series of "James Forrest" lectur[illegible] was

delivered, on the 2nd of May, by Professor W. C. Unwin, F.R.S., M.Inst.C.E., before a full and appreciative meeting. In conclusion, the Council referred to the operations connected with the rebuilding of the premises, as to the completion of which it was premature, they said, to make a definite statement. The report having, after full discussion, been adopted, votes of thanks were passed to the President, Vice-Presidents, and other members of Council, for their services in the management of the Institution; also to the Auditors and Scrutineers.

The ballot for Council resulted in the election of Sir B. Baker, K.C.M.G., as President; of Mr. J. Wolfe Barry, C.B., Mr. W. H. Preece, C.B., Sir Douglas Fox, and Mr. J. Mansergh, as Vice-Presidents; and of Dr. W. Anderson, Mr. A. R. Binnie, Mr. W. R. Galbraith, Mr. J. H. Greathead, Mr. J. C. Hawkshaw, Mr. C. Hawksley, Dr. J. Hopkinson, Dr. A. B. W. Kennedy, Sir G. L. Molesworth, K.C.I.E., Sir A. Noble, K.C.B., Sir E. J. Reed, K.C.B., M.P., Mr. W. Shelford, Mr. F. W. Webb, Sir W. H. White, K.C.B., and Sir E. Leader Williams, as members.

THE THWAITE MOTIVE POWER GAS-GENERATOR.

In the "Register of Patents" in the JOURNAL for the 26th of June last year, we noticed an apparatus devised by Mr. B. H. Thwaite for the generation of gaseous fuel from solid hydrocarbonaceous or carbonaceous material. The object sought to be attained by him was the economical production of a gas suitable for motive power purposes, but free from the objections attending that generally employed. Of the two kinds of gas at present utilized in this way—the ordinary illuminating gas and that produced in a generator—the first, owing to its mode of preparation, is too rich, and therefore requires dilution; while, in the production of the latter, only fuels of the fixed carbon class (such as anthracite, charcoal, or coke) could be used. Ordinary bituminous or steam coals could not be utilized, on account of the pipes conveying the resulting gas becoming obstructed by the deposit of the volatile hydrocarbons, light dust, and tarry matters thrown off in the process. It is claimed for the Thwaite plant that it is free from this objection, and that by its aid gas admirably suited for running engines—in fact, equal to ordinary gas diluted—is produced from any kind of coal. The plant is made in two forms— the "Simplex" and "Duplex." We have recently had an opportunity of inspecting it; and the following brief description will, no doubt, enable our readers to understand its operation.

The "Simplex" generator is a round vessel 8 feet high and 3 feet in diameter, and stands in about a foot of water. It is lined with fire-brick; and the fuel, which is fed in at the top by means of a hopper, is supported upon a heap of clinker, which is raked out under the water in which the furnace stands. There is no chimney, and consequently no trouble from smoke. The draught is created by a fan driven by a small gas-engine. This plant is suitable for dealing with anthracite or coke. The "Duplex" plant consists of two similar producers, connected at their upper part by a conduit. By one cycle of operations, one of the vessels acts as a scrubber of the gases generated in the other; and as the outlet into the mains is at the base of the second vessel, and on the other side of the water-bath, the gas is compelled to pass through a hydraulic seal, which effectually removes the least trace of deposited hydrocarbon or other suspended matter. By another cycle, the second vessel is filled with fuel as well as the first; and the draught is first directed into the fuel base of each vessel alternately, the current being changed automatically at intervals of about a minute. The resultant gases, together with the hydrocarbons from the fresh-fed fuel, are in this way compelled to descend through the column of incandescent fuel in either one or the other. Any carbon dioxide passing over from one vessel is converted, in its passage through the fuel in the second vessel, into carbon monoxide. No dust, tar, or dirt can enter the outlet-main if the apparatus is properly worked; and it is controllable by an ordinary labourer. There is a third cycle with the twin vessels, in which the hydrogen difficulty is solved in another way, and without reversal. In the complete arrangement of plant, the waste sensible heat of the gas-engine exhaust gases is utilized for heating the air supply to the generator plant; and the sensible heat of the generator gases as they leave the plant is recovered for the purpose of increasing the proportion of hydrogen in the gases produced. The water is added to the air by compelling the latter to force its way through the water in the bath, at the base of the fuel. After the gas leaves the generator, it passes through an ordinary pipe condenser, coke scrubber, and washer to the holder; and by the time it reaches this vessel, all the saturated and unfixed hydrocarbons have been removed. The uniform quality of gas resulting from the twin-vessel cycle is remarkable. The carbon dioxide has been determined by a number of analyses; and the average may be taken at 4½ per cent. It is claimed for the plant that it realizes the recuperator principle already developed for furnace work by Neilson and Siemens.

On the occasion of our visit, the "Simplex" producer was working with ordinary coke; the gas made being employed for running an engine driving a dynamo. The engine was going steadily at the rate of 152 revolutions per minute, with a pressure of 80 lbs. to the inch, and producing very good diagrams. Mr. Thwaite states that, with an engine of 15 to 20 horse power, an expenditure of less than 1½ lbs. of slack coal will develop one indicated horse-power-hour. This is a rather larger expenditure than with anthracite; but the lower cost and greater convenience of steam coal will, in many applications, more than compensate for the slight increase of fuel expenditure. Besides solid fuel—which includes coke, charcoal, sawdust, or even peat—the plant is available for using crude oil, or the cheap residue known as Astatki. It works noiselessly; and this fact, coupled with the advantage of being able to dispense with a steam-boiler, should commend it to the notice of power users, especially those requiring it for electric lighting purposes.

THE COMMERCIAL PRODUCTION OF CALCIUM CARBIDE.

The *Journal of the Franklin Institute* for last month contains a paper by Mr. T. L. WILLSON and Dr. J. J. SUCKERT on "The Carbides and Acetylene Commercially Considered." We give below an abstract of the introductory portion; reproducing in full the latter part, which has the greatest interest for gas managers.

The authors begin by giving a brief history of carbides and acetylene. They explain their methods of formation and their chemical and physical properties, and touch on the successive researches of Sir Humphry Davy, Berzelius (1836), Woehler (1862), Berthelot (1866), and Willson (1888). They conclude this section of their paper by showing that acetylene has three physical conditions—viz., gaseous, liquid, and solid; and they point out that the mere fact that it readily assumes the two former states is of vital importance to its commercial application. This is the branch of the subject the authors next take up. While showing that carbide of calcium is a rich source of acetylene, they confess that beyond this they cannot at present definitely designate additional commercial applications of the material. Extended experiments are being conducted to determine its commercial value, which, of course, depends largely upon the cost, the purity of the article, and the worth of the residuals. They go on to describe the experiments carried out by Mr. Willson, which resulted in the production of carbide of calcium, but at a cost largely in excess of that for which they say it can be manufactured to-day. This leads them to the really practical portion of their paper, which is as follows:—

Arrangements are now being made by the Electro-Gas Company, of New York City, with the Niagara Falls Power Company, to apply 1000 electrical horse power for the manufacture of calcium carbide, which is shortly to be increased to 5000-horse power; and eventually we shall, without a doubt, see the entire available power the Company now possess converted into electrical energy for the manufacture of this product. The effect of such a production would be far-reaching; and the economies resulting therefrom, if stated, would appear exaggerated and visionary. Assuming that but 20 lbs. of the carbide are produced per indicated horse power each 24 hours, then the amount manufactured during 300 working days would be 3 tons per horse power per annum; and, applying 100,000-horse power to its production, the annual output of such an establishment would be 300,000 tons. From this amount of material, 3300 million cubic feet of acetylene gas should be produced; and as its illuminating power, compared with ordinary illuminating gas of 25-candle power, is as 10:1, it would represent fully 33,000 million cubic feet of this gas—an amount which would probably equal the annual output of the entire gas industry of the United States. As this is but one of the many applications of the product obtained by the decomposition of the carbide with water, the manufacture of the carbide itself must, of necessity, become a large industry.

Pure calcium carbide contains in 100 parts, 37·5 parts of carbon and 62·5 parts of calcium; and when brought in contact with water, acetylene is generated to the extent of 5·89 cubic feet of the gas to each pound of carbide used. If compared by weight, 100 lbs. of calcium carbide and 56·25 lbs. of water evolve 40·63 lbs. of acetylene gas, and form 115·62 lbs. of calcic hydrate, in accordance with the following formula:—

$$CaC_2 + 2H_2O = CaOH_2O + C_2H_2$$
$$100 + 56{\cdot}25 = 115{\cdot}62 + 40{\cdot}625 \text{ (lbs.)}$$

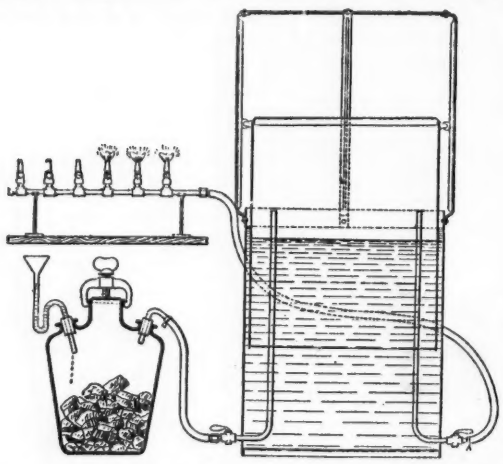
The acetylene gas so generated contains, in 100 parts, 92·3 parts of carbon and 7·7 parts of hydrogen; or, in the 40·625 lbs. generated from 100 lbs. of carbide, we have 37½ lbs. of carbon and 3⅛ lbs. of hydrogen. The entire carbon contained in the calcium carbide has therefore combined with the hydrogen of the decomposed water to form a new compound of a gaseous nature, and extremely rich in carbon.

In its commercial application, acetylene can be produced either directly from the calcium carbide by decomposition with water, or it may be evolved from the liquefied gas contained in suitable receivers. When manufactured directly from the carbide, two methods can be employed. In one, small quantities of water are allowed to flow upon the carbide, and the resulting gas is conducted to an ordinary gasholder, from which it can be drawn for use. This method is more or less intermittent. The other method dispenses with a gasholder, and permits the continuous generation of either large or small quantities of the gas. This is accomplished by partially submerging in water a

vessel, open at the bottom, and containing carbide suspended on a screen in the upper part; the generated gas being withdrawn from above the carbide. As long as gas is being used, the water remains more or less in contact with the carbide. As soon, however, as the withdrawal of gas diminishes or entirely ceases, the pressure of the generated gas forces the water from the carbide into the lower chamber of the vessel; thereby preventing a further generation of the gas. The apparatus is automatic, and extremely regular in its operation. In the employment of either of the above methods, the only bye-product obtained is slaked lime; the amount of gas produced being the same—viz., 5½ cubic feet for each pound of calcium carbide used.

The liquefied gas is manufactured commercially by decomposing the carbide of calcium with water in a closed vessel, and conducting the generated gas under pressure to a condenser, where it liquefies, and is then drawn off in tanks ready for distribution.

As an illuminant, acetylene surpasses in lighting power and economy all other illuminants known. When burned at the rate of 5 cubic feet per hour, it produces a light equal to 250 candles; whereas the best illuminating gas made from coal or water gas rarely exceeds 22 candles for each 5 cubic feet burned per hour. Philadelphia City gas is rated at from 19 to 20 candles. Acetylene gas will, therefore, produce 12½ times more light if the same quantity be consumed, or 1000 cubic feet of acetylene gas will give you the equivalent in lighting power of 12,500 cubic feet of your city gas. It has therefore 12½ times the value. To illustrate more fully the difference, we will first pass your city gas to the tube attached to this stand, and ignite the gas as it issues from the burners. We will then conduct acetylene gas to a similar row of burners, and light these. The contrast is almost marvellous.



The acetylene consumed in these burners has been generated, in the apparatus shown [see diagram] in the following manner: Upon the carbide contained in the closed jar, water is poured in small quantities through the glass funnel communicating with the interior of the jar. The acetylene gas generated passes through this tube to the inside of the gasholder—thereby lifting it; and the gas can then be conducted therefrom to the burners by means of the rubber tube. As the gas is being consumed, and the holder lowers, the supply is rapidly renewed by pouring an additional quantity of water through the funnel upon the carbide contained in the closed jar. We will also light the gas produced from liquefied acetylene; and it will be seen to burn with the same brilliancy and lighting power as the gas produced directly from the carbide. The liquefied gas weighs just 2 lbs., which is at the rate of 14⅛ cubic feet per pound.

The gas produced by the vaporization of the liquid at a pressure of 40 atmospheres passes from the containing tank to a reducing-valve upon which the tank stands, whereby its pressure is reduced to that of a 2-inch column of water; and it is under this pressure that the gas is being supplied to the burners attached to the arm above. Each of the burners supplied with acetylene gas will consume, at the pressure indicated, 1·2 cubic feet per hour; each, therefore, emits a light equal to 60-candle power. The total candle power of the six burners in use is therefore 360; and the quantity of gas consumed each hour, 7⅕ cubic feet. To obtain this result with Philadelphia gas would require the consumption of at least 90 cubic feet per hour. The amount of oxygen withdrawn from the atmosphere by the acetylene for the same amount of light is but one-sixth of that required for the city gas. The products of combustion are, therefore, reduced in proportion; and the air of the room is not vitiated to the same extent.

From the appearance of the acetylene flame, it would seem as though its temperature was exceedingly high. But recent determinations have shown that its temperature does not exceed 900° C.; whereas that of ordinary illuminating gas exceeds 1400° C. For an equal amount of light, the heat developed by the combustion of acetylene gas but slightly exceeds that of the incandescent electric lamp.

We have before us, therefore, an ideal illuminating gas. Its presence in a room can readily be detected by its penetrating odour; it emits more light, with less heat, than any other illuminating compound; it consumes less oxygen; and it can be commercially produced at less cost for an equal amount of light. Furthermore, it is capable of being stored as a solid in the form of carbide, as a gas, or as a liquid. These qualities are of exceptional value in its commercial application. As a solid, in the form of carbide, waste water power throughout the world can be utilized for its manufacture, and it can be shipped long distances without material deterioration; as a gas, it can be generated from carbide, and so applied as such; and in the form of a liquid, it can be applied to all purposes of isolated lighting—such as railroad and street cars, carriages, bicycles, steamships, sailing vessels, street lighting (by placing a small tank in each lamp-post), house lighting, in both city and country, buoys, lighthouses, lanterns—as well as for enriching ordinary illuminating gas in dwellings. Its application to this latter purpose will permit gas companies to produce a low-priced gas for heating purposes, which can then readily be enriched in each house with acetylene gas generated from a tank of the liquefied gas. To show the value of acetylene gas if applied to the lighting of your city, we will make a comparison which may surprise you. The quantity of gas produced by your city works will approximate 4000 million cubic feet per annum of (say) 20-candle power. By the use of acetylene gas, the gas required would be reduced in the proportion of 1 : 12·5; or, 4000 million cubic feet of city gas could be replaced by 320 million cubic feet of acetylene gas—representing a saving of 3680 million cubic feet of gas annually.

In addition to its value as an illuminant, acetylene gas can be employed commercially for power and heating purposes; and in the form of a liquefied gas, it will be invaluable for these uses. Its application in this direction is, however, such an extensive one, that we are compelled to make it the subject-matter of another paper.

Society of Engineers.—The Council of this Society have arranged with the Council of the United Service Institution, Whitehall, for holding the future ordinary meetings of the Society in the lecture theatre of the Institution; and on Monday, the 10th inst., Mr. H. W. Umney will read a paper there on "Safety Appliances for Elevators." On the following Wednesday, the members and their friends will visit the Waterloo and City Railway works now in progress at Upper Ground Street, Blackfriars Road, and the new City of London Brewery, Upper Thames Street.

The Bakerian Lecture at the Royal Society.—We have been favoured with an abstract of the third section of the above lecture, by Mr. A. Vernon Harcourt, M.A., F.R.S., Student of Christ Church, and Lee's Reader in Chemistry, Oxford, and Mr. W. Esson, M.A., F.R.S., Fellow of Merton College, and Deputy Savilian Professor of Geometry in the University of Oxford. The subject of the lecture is "On the Laws of Connection between the Conditions of Chemical Change and its Amount;" and the portion now under notice gives an account of "Further Researches on the Reaction of Hydrogen Dioxide and Hydrogen Iodide."

The Belfast Coal Contract—In the report on the Lancashire coal trade in the last number of the JOURNAL, our correspondent repeated a rumour which had reached him that the Belfast contract had been concluded at prices ranging from 11s. 6d. to 12s. 6d. per ton delivered. Mr. Stelfox writes that he is glad to know what good things are in store for them in the way of coal prices; but seeing that they have not yet come into the market, the figures which reached our correspondent must have related to some other contract. He says they are almost good enough to tempt one to take the responsibility of going into the market at once; but their wants at Belfast are already covered for some months ahead.

Extension of Messrs. Alder and Mackay's Premises.—Legal sanction has been obtained by Messrs. Alder and Mackay, of Edinburgh, for an extension of their New Grange Works. The building is to be 110 feet long; and it will consist of a new machine-room, foreman's office, &c. The plans have been prepared by their Manager (Mr. J. H. Bennet), under whose direction and supervision their entire premises, both in Edinburgh and at Bradford, were erected. This is the second extension the firm have required since they removed to their new premises in the western suburb of Edinburgh four years ago; the floor space in their works being now four times greater than in their old ones.

The Recent Advance in the Price of Oil.—The recent increase in the price of oil seems to be having a beneficial effect upon the gas supply in the suburbs of London where prepayment meters have been adopted. A correspondent writes that, in West Kent, cottages cannot be connected with the mains in proportion to the orders received; and he believes that by the time the dark nights again set in, the users of gas in such places as Sidcup, Bexley, and the Cray Valley generally, will have doubled in numbers. The cottagers have convinced themselves that gas is quite as cheap as oil, both for cooking and lighting purposes; and it possesses the additional advantage of being cleaner, and also free from the objectionable smells which accompany most burning oils.

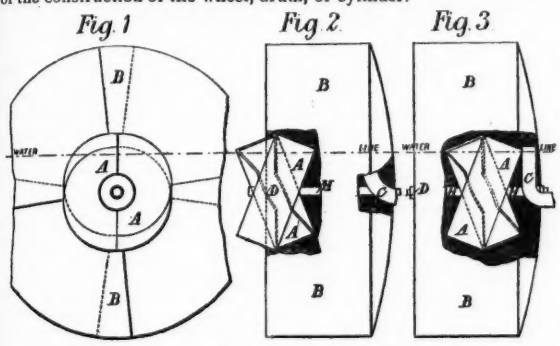
REGISTER OF PATENTS.

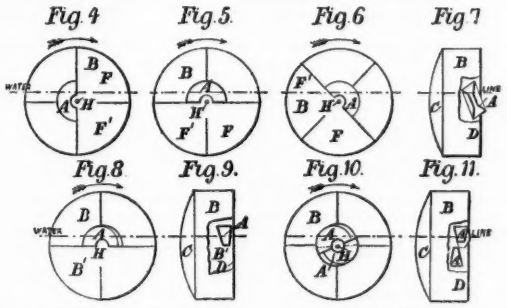
Gas Pressure-Regulators.—Thompson, W. P.; communicated from H. L. Fuge, of Hanover. No. 24,406; Dec. 19, 1893.

Most pressure regulators or reducers hitherto employed for gases, liquids, or steam under pressure—working by a diaphragm and fitted with a valve for admitting the gas, operated by the diaphragm by levers or other mechanism—have all the drawback that the valve itself and the mechanism operating it easily become oxidized, owing to the moisture contained in the gas or steam. In order to remove this drawback, the diaphragm pressure-regulator which forms the object of this invention is so arranged that the diaphragm itself forms the valve for the admission of the gas, so that the oxidation of the valve and the interruption of working resulting therefrom are obviated. With this object in view, the case of the regulator is arranged in such a way that the diaphragm is divided into two or more parts, one of which (the larger part) is invariably employed for the chamber of the pressure-regulator in which the pressure of the gas or steam is reduced; and the remaining smaller portion (or portions) of the diaphragm is utilized for closing the inlet apertures for the admission of the gas or steam. Several forms of pressure-regulator are shown in detail on the drawings accompanying the specification.

Gas-Meters.—Warner, W. J., of South Shields, and Cowan, William, of Edinburgh. No. 4504; March 3, 1894.

This invention, in the construction of wet gas-meters, as described in patent No. 1698 of 1874, relates to the portion of the wheel, drum, or cylinder employed for "abstracting or withdrawing a portion of gas after passing from the inlet, and returning to it again more or less of the gas in excess of the volume that should be passed to the burners." The objects of the present invention are the formation of abstracting or withdrawing channels, having a uniform (or approximately so) sectional cross area through the whole of their section—other than that by the variation of the water-line—so as to abstract and deliver the compensating volumes with greater freedom than has hitherto been done; also the simplification of the construction of the wheel, drum, or cylinder.





The practical application of the invention to an ordinary or common wheel is shown in the illustrations. Fig. 1 is an elevation, and fig. 2 a side elevation (partly in section), of an ordinary four-chambered wheel, drum, or cylinder fitted into the substitute for an inner wheel, composed of two plain segments of a circle or cylinder. Fig. 3 is a side elevation of a modification. Figs. 4 to 11 are diagrams hereafter referred to.

The segments A are mounted within the drum B, so as to be near the inlet side C, as in fig. 3, or near the outlet or case side D of the wheel, as shown in fig. 2; and the section of the segments is as follows: Fig. 4 shows a drum or wheel having a segment A of half a cylinder fixed concentrically within it; the segment opening into two adjoining chambers of the wheel through their opposite partitions. The two chambers on the opposite side are cut off, but subject to the external influence of the segment, as in the case of the inner wheel, as described in the 1874 patent, making about half of each of the chambers of unvarying capacity. The discharging chamber F has the abstracting segment A open to it, so as to take in its volume of gas till the chamber is closed by entering the water, as in fig. 5, and will be held until the chamber F^1 rises out of the water and allows the discharge to take place into the chamber F^1 from the segment A, as in fig. 6.

In this means of abstracting or withdrawing the surplus of the volume delivered by the wheel, there is no interference with what may be called the passive character of the principle that, as the segments occupy about half the variable portion of the chambers of the wheel, that portion is not affected by the variations of the water-line—such variation taking place below the periphery of the segments—and the active principle that the inner portion of the segmental chamber abstracts or withdraws the surplus of the volume that would otherwise be delivered by the enlarged chamber of the wheel. Figs. 4, 5, and 6 show diagram views of the wheel B having only one of the segmental channels A shown. It is obvious from this that two should be used to complete or leave the passive feature of the arrangement untouched—that is to say, to reduce the variable portion of the whole of the chambers of the wheel to about one-half. In this arrangement the channel A is empty; but as the wheel B revolves, the channel will rise up from the water, take in the volume of gas, and discharge it into the chamber B^1.

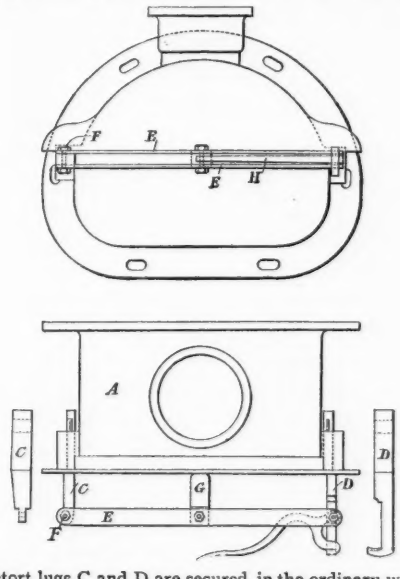
This arrangement is the most simple for describing the principle; but the relative positions of the segmental channels A may be varied. In the arrangement shown, the compensating action is, between chamber and chamber, entirely internal. The patentees, however, prefer to this, the placing of the two chambers A together at the back of the wheel, with communication through the back into the outer case; and thus communicate with the outlet gas, as shown in figs. 7 to 11. The action is the same as that described with reference to figs. 4, 5, and 6; the channel A discharging the volume of gas which it has taken from the outside of the wheel, into a chamber of the wheel.

In carrying the invention into practice, the mode of procedure would be as is shown in figs. 1 and 2. The channel segments A are placed with their axis obliquely to the shaft H, and across each other at a greater or less angle, and with their intake ends projecting beyond the plane of the back D of the wheel B. The gas is delivered from the other end direct into the chambers, through the partitions to which they are soldered, to below the lowest water-line. The channel or segmental chamber A must have a perfectly sound communication between each intake and delivery above the water-line, and entirely separate and distinct from each other. A true spiral form allows of the channels being placed more compactly within the wheel. Or, as shown in fig. 3, the channels A may be so arranged as to have their outlet-ends projecting through the front of the wheel B into the inlet-chamber C of the wheel B.

As a modification, a smaller spiral channel may be employed, but with a greater pitch. This may be arranged between the end of the wheel and each chamber of it; the segments, of course, being sufficient to have their two ends sealed at low water. It is, however, desirable that the wheel should be made as simple as possible, and with as free a water-way as can be got through the centre of the wheel; and beyond this there is the economy of construction. The segment, too, should be as near as possible concentric with the wheel, that there may be no unnecessary disturbance of the water, and that the wheel may pass through unimpeded in its action.

Retort-Lid Fastenings.—Watson, S., of Tunstall, and Young, J., of Stoke-on-Trent. No. 7575; April 17, 1894.

According to this invention, the lid of the retort is secured by a cross-bar forced against it by a lever and cam-surface, instead of by a screw.



To the retort lugs C and D are secured in the ordinary way by keys. E is a double cross-bar pivoted by a bolt F to the lug C. At the middle of the bars is secured a stud G, which bears against the centre of the lid. H is a lever pivoted to the bars, and having upon it a cam-shaped projection, which bears against a hook at the end of the lug D. When the lever is pressed towards the retort, the action of the cam against the hook forces the stud G against the lid, and securely holds it; the cam being so formed that it does not turn back again unless actuated by the lever H.

Operating and Controlling the Valves of Gas and other Engines.—Butter, F. H., of Plumstead. No. 7630; April 17, 1894.

The essential features of this "automatic variable expansion gear," consist of a pinion gearing with a pair of racks arranged parallel with each other on opposite sides of the pinion. The pinion is journalled on a pair of blocks on a cross-head, sliding in guides, and connected to the rod of the eccentric, cam, or other device, which gives motion to the valve. One of the racks is fixed to the rod or spindle of the valve which is to be operated; the other (the governing rack), which, as before mentioned, gears with the opposite side of the pinion, is capable of a certain amount of sliding motion in guides parallel to the motion of the valve-rod. Now, if this governing rack be fixed, the pinion must rotate upon it; and therefore the extent of motion imparted to the valve-rod will be double the throw of the eccentric or cam. If it be perfectly free to move, the pinion will rotate upon the valve-rod rack—moving only

the governing rack; and no motion will be imparted to the valve. But if resistance be offered to the motion of the governing rack, both racks will be moved by the pinion; and the amount of travel of the valve will be in inverse proportion to the amount of resistance opposed to the motion of the governing rack. The amount of this resistance is regulated automatically, by suitable arrangements and devices.

Prepayment Gas-Meters.—Cowan, W. and W. H., of Edinburgh. No. 7988; April 23, 1894.

This invention in prepayment meters consists of modifications of, as well as additions to, Mr. W. Cowan's former patented arrangement —No. 24,490 of 1893. The objects of the present invention are as follows: 1. To provide means of a more effective character, whereby all coins or tokens which are not at once dropped out of the eccentric coin-carrier at the end of its forward movement shall be pushed out at that point. 2 To provide means whereby coins or tokens having strings or wires attached to them may be prevented from being withdrawn from the meter after they have been used to actuate the prepayment mechanism. 3. To provide means whereby the supplementary valve may be employed more efficiently, so as to prevent the fraud sometimes practised of causing the pawl of the eccentric to be kept in gear with the prepayment wheel, for the purpose of obtaining a supply of gas which has not been paid for. 4. To provide means of a more simple and effective character for arresting the mechanism of dry meters, when the eccentric pawl is retained in any other than its normal position. 5. To provide means of a more simple, effective, and direct character than hitherto for operating the supplementary valve, in both dry and wet gas-meters. 6. To provide means for guarding against an escape of gas in the event of the supplementary valve not being gas-tight, in both dry and wet gas-meters.

Fig. 1.

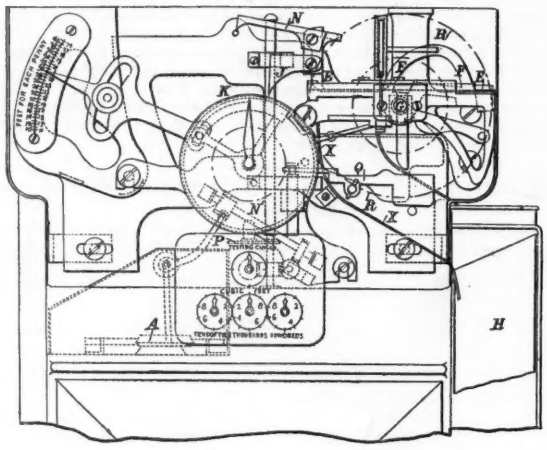


Fig. 2.

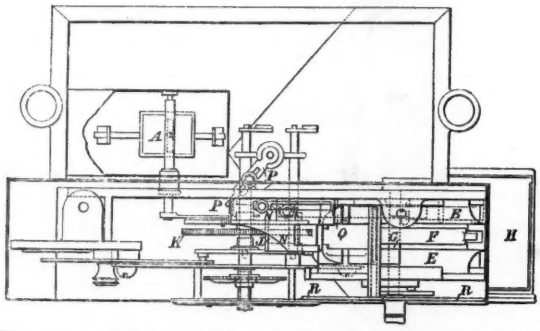


Fig. 1 is an elevation, and fig. 2 a plan, of a dry gas-meter having these improvements applied thereto; the cover being removed for the sake of clearness.

To provide for all coins not at once dropped out of the eccentric coin-carrier E at the end of its forward movement being pushed out at that point into the money-box H by the eccentric tongue F, there is a tongue F of the eccentric with a hook or projection, which, after the carrier E has reached the end of its travel, comes down upon the edge of the coin, and so forces it out of the slot of the carrier.

To prevent coins having strings or wires attached to them from being withdrawn from the meter after they have been used to actuate the prepayment mechanism, the patentees employ a disc R (having a slot or opening in it near its periphery), mounted on the operating spindle G of the tongue of the eccentric lever F. The slot is preferably formed with one or more of its sides or ends as knife-edges, so as to cut the string or wire, and thus prevent the coin being withdrawn. But in the event of the string or wire not being cut, the slot will so entangle the string as to prevent the withdrawal of the coin. The position of the slot is such that the coin can only be inserted when the disc-slot opens the passage to the main carrier-slot; and this can only occur when the eccentric coin-carrier E is in its normal position. In any other position, the disc acts as a shutter to the carrier slot.

The means for arresting the mechanism of dry meters, when the eccentric pawl J is retained in any other than its normal position, consists of a pawl-shaped lever N, pivoted to the front end of the eccentric carrier E, and provided at its other extremity with a support, upon which it rests when the eccentric carrier E is in its normal position. The lever is formed with a slot or opening, through which passes a depending rod, having an enlarged head, and provided with one or more guide-brackets. The arrangement is such that, on the eccentric carrier E being moved forward, the lever N will leave its rest or support, and so lower the rod into the path of the ordinary tangent P. It thus stops the meter in the event of the eccentric carrier E and lever N not being returned to their normal positions.

To provide means for operating the supplementary valve, the inventors prefer to employ a slide-valve of somewhat similar construction to those used in ordinary dry meters. This particular form of slide-valve has a longitudinal slot or opening extending nearly from side to side, through both seat and cover; so that when the cover A is slightly moved within the valve-box, the valve is either closed or opened, so as to exclude or admit the passage of gas to the main valve-chamber. The cover portion of the valve is made larger than the seat, so that it may always keep the seat covered, and thereby prevent as far as possible the deposit of any substance upon the seat which would interfere with the efficient working of the valve. As shown in the engravings, the front end of the spindle is provided with an arm at right angles to it, having a projecting pin, which bears upon the periphery of a plain wheel or band mounted on the prepayment wheel K, or attached to its spindle or boss. The plain wheel is provided with a recess and projection for catching the pin on the end of the valve-spindle arm when required to open or close the valve.

To guard against an escape of gas in the event of the supplementary valve A not being gas-tight, a special stop (as an addition and supplementary to the valve) is arranged, capable of obstructing the movement of the mechanism, when placed for that purpose, just as the valve closes, and removed when the valve is opened. By this means, what may be called a "second line of defence" against the escape of gas is provided; because it would require both the valve A and the meter to be unsound before an escape of gas could occur. The supplementary or special stop (in addition to the valve) is preferably so arranged that it will come into action immediately on the valve A being closed; though it may in some cases be made to constitute the "first line of defence"—the valve in this case acting as the second line of defence against escape. In this latter case, the mechanism of both the stop and the valve would be so arranged as to bring about the desired effect. In some cases, the mechanism of both valve and stop may be arranged to act almost simultaneously; so that, if one were to fail, the other would act, and so ensure the supply of gas being cut off.

In applying the foregoing to a dry meter, a double-armed lever Q is pivoted to the framing of the index-chamber, and arranged in such a manner that one of its ends (which may be bent downwards) is provided with a depending rod or stop-pin, so arranged as to enable the pin to be placed in the path of the tangent P by a projecting pin on the prepayment wheel K, though preferably on the plain wheel or band attached to it. The pin only comes into action when the amount of gas paid for has been consumed. The other end of the lever Q is provided with a suitable balance-weight, so as to keep it normally out of the path of the tangent P. The weight is to keep the rod or stop-pin out of the path of the tangent P. When the amount of gas paid for has been consumed, the pin places the rod or stop-pin in the path of the tangent; and by this movement the heel on the arm is brought up into the path of the depending rod. On the purchase of any gas, the coin-carrier E is brought forward; and the depending rod presses down the arm, and thereby lifts the rod or stop-pin out of the path of the tangent. The weight does not lift the pin out of its path, but merely keeps it out of the path of the tangent when it has been lifted out as described.

Gas Carburetting Apparatus.—Ormerod, J., of Manchester. No. 11,256; June 11, 1894.

In this apparatus a carburetting liquid is used which will not flash at or below the temperature prescribed by the existing Petroleum Act; the liquid consisting of an admixture of benzine from petroleum, having a specific gravity of about ·720 to ·750, and rosin spirit having a specific gravity of about ·800, in the proportions of about two parts of benzine to about one part of rosin spirit.

The apparatus used consists of a metallic chamber, to the lower portion of which the liquid is admitted (in proportion to its evaporation), by a ball-cock or otherwise. This part of the chamber is divided by radial perforated partitions, through which wires are threaded, for the suspension thereon of wicks, the lower ends of which dip into the carburetting liquid. The gas to be enriched is also admitted to this part of the chamber; and by contact with the wetted wicks, it becomes supercharged with the vapours of the liquid. Above the chamber, there is a second chamber, consisting of an annular part and a central circular part. The annular part is divided by perforated radial partitions, as in the case of the lower chamber; and, as in the lower chamber, one of the partitions is replaced by a solid plate. The spaces between the perforated partitions are lightly packed with cotton wool or similar material; and from them, or some of them, gutters lead into the liquid in the lower chamber. The central part of the chamber contains a circular pipe, the inner circumference of which is radially perforated; and this part of the chamber is also lightly packed with charcoal or similar material, in pieces. The saturated gas, rising from the lower chamber into one of the spaces in the annular part of the upper chamber next to the solid division-plate, passes through the cotton wool in all the spaces until it reaches the last, from which there is an outlet to the perforated pipe, through which it passes into the mass of charcoal. In this way, the saturated gas is "relieved from any free globules of the carburetting liquid, and a practically permanent mixture is obtained."

Gas-Engines.—Dawson, H. T., of Upper Woburn Place, London. No. 11,802; June 18, 1894.

The main features of novelty in this engine consist of: (1) A relieving cylinder connected with the working cylinder, and operating, by means of its piston, upon the exhaust-valve in such manner as to counteract the gaseous pressure upon the valve tending to hold it to its seat, thereby enabling the valve to be easily opened by other

mechanism provided to move it. (2) The construction of the exhaust-valve so that the gaseous pressure in the engine does not tend to close it or to force it to either side, and so that when open the valve is little exposed to contact with the heated gases, but for the most part with water-cooled metal. (3) An arrangement for circulating water through the valve and parts attached to it; their movement alternately drawing water into, and expelling it from, a chamber forming part of the circulating system, which includes the hollow valve. (4) An arrangement for controlling the admission of gas to the engine, consisting of a pair of sleeves with engaging jaws, one of such sleeves rotating with its shaft, and being moved endwise thereon by a centrifugal governor, while the other sleeve (being loose upon the shaft and carrying a cam) operates upon a lever connected with the gas-valve. The whole arrangement is such that the cam remains at rest, except when the movement imparted by the governor causes the jaws to engage.

Closing and Opening Gas Pipes and Connections.—Weuste, C., of Mülheim, Germany. No. 12,021; June 21, 1894.

This invention relates to apparatus for closing and opening gas-pipes of all kinds, by transmitting liquid from two vessels communicating with each other, and partially filled with the liquid, into a liquid seal in the gas outlet-pipe; the seal being opened or closed by varying the pressure in the gas-pipe.

Fig 1

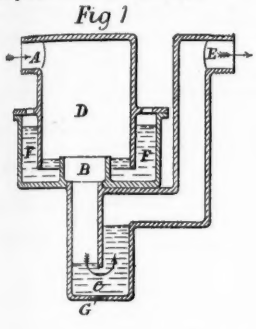
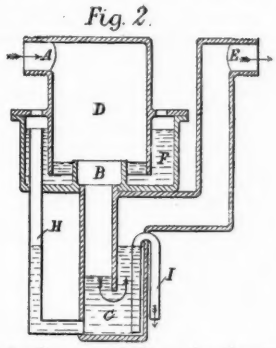


Fig. 2.



Figs. 1 and 2 show an inlet-pipe A leading to a bell or chamber D, the lower end of which projects into a receptacle F. B is a short pipe projecting upward from the bottom of the receptacle, and forming a communication with the liquid seal C, which communicates with the outlet E for the gas; the seal being provided with an opening G to allow of the escape of the liquid.

Fig. 1 shows a construction such that, when the gas pressure is interrupted or decreased, the burners will be extinguished by the closing of the liquid seal, which is effected by the liquid in the receptacle F passing into the liquid seal-chamber C. By this means, the outlet-pipe is closed; and when the pressure is again established, all danger of escape of gas will be obviated.

If this protection is to be provided for an entire house, the apparatus must in this case be arranged in front of the main-cock. Furthermore, the apparatus may be used in order to protect single chandeliers or gas-stoves or the like. When, for instance, in a house the main-cock is closed, and it has been forgotten to turn off a stove or chandelier connected with the apparatus, the latter will close the supply automatically, so that, when the main-cock is opened again, escape of gas will be obviated.

In fig. 2, the apparatus has for its object to shut off and also open again lamps for street and domestic lighting or other devices, at any distance from a central point. If the lamps are to be extinguished, the gas pressure is for a moment increased from the central point. Owing to this increased pressure, the liquid runs through the pipe H, and closes the pipe. By another pressure, a quantity of liquid again runs through the pipe H; the level of the liquid in the seal chamber thereby rising to such a height that it is higher than the top of the syphon provided therein, so that the latter will operate to withdraw the liquid from the chamber C, and the pipe will again be opened. The legs of the syphon are of such length that a certain quantity of liquid will remain in the seal chamber, and prevent escape of gas through the syphon.

The apparatus acts as follows: The gas enters through the pipe A (fig. 1), and passes through the pipe B and the water-seal chamber C to the pipe E, and thence to the place where it is to be used. Usually there is no liquid in the water-seal chamber C, so that the gas has a free passage. When the receptacle F is filled with liquid, the latter in the bell or chamber D (which communicates with the receptacle F) will be lowered, in accordance with the pressure of the gas in the chamber. This level is so adjusted that, at the lowest pressure admissible, it will coincide with the top of the pipe B. If the pressure of the gas is diminished from any cause, so that any burners which may at the time be lighted are extinguished, the liquid from the receptacle F, owing to its tendency to find it sown level, will partly flow into the pipe B, and close the seal C. On renewal of the pressure, the liquid in the water-seal chamber C will prevent any passage of gas. Danger through escape of gas is thereby obviated. When it is desired to again provide a free passage for the gas, the liquid is caused to flow from the water seal chamber through the outlet G.

In fig. 2, the gas enters through the pipe A, and, as in fig. 1, it passes to the outlet-pipe E. If the pipe is to be shut off, the pressure is increased for a moment at the central point, whereby the liquid is forced back into the receptacle F. It will consequently flow partially through the pipe H into the chamber C, thus closing the pipe. To again provide a free passage for the gas, the pressure is raised once more, so that the liquid in the water-seal chamber is raised above the top of the syphon I provided therein. The latter then draws the liquid from the chamber C, and thereby opens the passage again to the gas. The corresponding lamps, which must be supplied with an igniting flame, are lighted again in consequence of the inlet of gas. The legs of the syphon are of such length that a portion of the liquid remains in the bottom of the water-seal chamber, and closes the inlet opening of the syphon, so that the gas cannot flow out through it.

Purification of Gas.—Hermite, E., Cooper, C. F., and Paterson, E. J., of Dalston. No. 12,663; June 29, 1894.

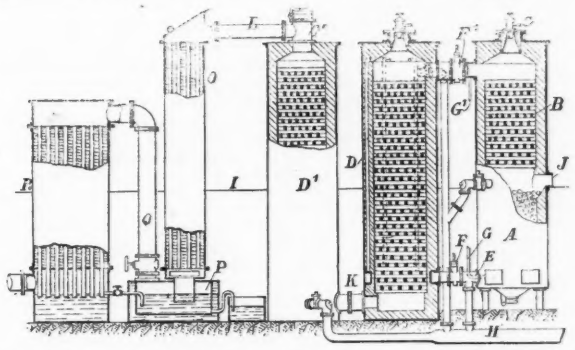
This invention relates to the purifying of gas from sulphuretted hydrogen, by passing it through a scrubber containing, as usual, moistened fragments of coke; but the patentees propose to use for moistening the coke an electrolyzed solution of sodium chloride mixed with a little magnesium chloride. The electrolyzing of the liquid—which may be effected by apparatus such as that described in patent No. 1993 of 1887—has the effect of putting the chlorine contained in the solution in such a condition that, when any sulphuretted hydrogen meets the liquid, it is at once decomposed; the sulphur being precipitated, and the hydrogen combining with the chlorine. The liquid to be electrolyzed may be sea-water.

Cooling the Circulating Water in Gas-Engines, and Heating the Air to be Mixed with the Gas previous to Explosion.—Terry, H. S., of Victoria Street, S.W. No. 12,840; July 3, 1894.

This invention has for its object the economy of cooling water used for circulating in gas-engines, and also economy in gas by the use of a portion of the waste heat in the water for warming the air before mixture with the gas. These objects are attained by providing a tank as the base or frame of the engine, in which are a series of tubes as in a portable engine. Through these tubes, air is caused to flow as described in patent No. 16,496 of 1893, either by the action of the exhaust in the chimney, by the aid of fans, or by other artificial means. The tubes are surrounded by the water in the tank (means for circulating which may be provided); and the air in this case does not come in contact with the water, and therefore does not produce evaporation and consequent loss of water. It abstracts the heat from the water while remaining dry, and attains a temperature which admits of a portion of it being used advantageously to mix with the gas before explosion, thereby raising the temperature of explosion and increasing the economy. The air may be further heated to increase the efficiency in this direction by a heater consisting of passages cast in a chamber surrounding the exhaust, or a series of pipes arranged so as to abstract heat from the exhaust vapour before entering the chimney. Suitable means are provided for adjusting and controlling the flow of air through the cooler, and for circulating the water in the tank.

Carburetting Water Gas.—Humphreys, A. C., and Glasgow, A. G., of Victoria Street, Westminster. No. 3089; Feb. 12, 1895.

This invention, relating to the manufacture of carburetted water gas, has for its object "the more economical use of oils, and especially of difficult oils for carburetting the gas in the process of its manufacture." In its most complete sense, the method consists "in passing water gas through the distilling chamber, the carburetting and fixing chambers, and the surface condenser; the distilling and carburetting and fixing chambers being preheated, and preferably to temperatures which do not substantially exceed those at which a gas having the maximum illuminating effect is produced from the oil employed." The proposal is to inject into the top of the carburetting chamber a liquid hydrocarbon, which is carried with the gas through the chamber; and into the top of the distilling chamber the heavy tarry oil condensed in the surface condenser is injected, percolating through the filling of the chamber in the opposite direction to the ascending gas. The portion which is not vaporized falls on to the fuel-bed in the generator, where it forms a valuable addition to the fuel supply.



A is the generator; B, the distilling chamber, filled with refractory material; C, the oil-supplying device at the top; D D^1 are carburetting and fixing chambers of the usual construction, connected by a conduit K, receiving gas from the top of the distilling chamber, and delivering it through the conduit L. M is the opening through which the blast-gases issue to the stack. At the head of the chamber D is the oil-supplying device; and, when it is in use, the chamber is what is generally called a carburetter. A conduit E leads from the base of the generator to an annular chamber surrounding the base of the chamber D, and thence pipe-flues lead through the walls of D to its top. This construction, it is claimed, is advantageous in saving room, keeping the gases hot, and introducing them in such a way that oil will not tend to run down in the conduit leading from the base of the generator. Valves F F^1 are provided for closing either conduit leading from the generator. G is a steam-pipe leading to the base of the generator in the usual way; and G^1 is a steam-pipe leading into the top of the chamber B. H is the air-blast main; a connection leading to the base of the generator. Other connections lead to the base of the chamber B; to the head of the chamber D; and to the base of the chamber D^1. The air is admitted through these various conduits for blowing up the fire in the generator, and for heating the

various chambers B D D¹. I is the level of the operating floor; and J, the feed-door of the generator.

The conduit L leads into the head of a surface condenser O, the body of which is kept full of cold water, while through it lead pipes connecting with the liquid seal-box P below the level of the fluid therein—which consists of heavy tarry hydrocarbons condensed from the gas, and which serves to prevent any backward flow of gas, as well as to scrub the gas and free it from the tarry condensed oils. Having attained the desired level in the box P, the oils escape through the bent pipe shown. A water jacket surrounds the box P, and serves to keep the oils in it cool.

From the box P the gas passes, through the conduit Q, into the head of the surface condenser R, the body of which—like that of O—is cooled by water through which pass multiple pipes extending down into the head and below the level at which the condensed heavy oils stand therein. Thus the gas issuing in numerous fine streams is exposed to a thorough scrubbing before it passes off.

In operation, the fuel charged into the generator through the door J is brought to a proper degree of heat by means of the blast; and the fuel gas generated in this operation is passed through the chambers B D D¹, admitting air in properly regulated quantities to each chamber, in order to insure proper combustion and the desired temperature in each. The air blast is then cut off, and steam admitted through the pipe G; the valve F being closed and the valve F¹ open. At the same time, liquid hydrocarbon (preferably, as described, the oil tar which remains after the more volatile parts have been driven off from lighter oils or any oily matter containing a large percentage of pitch, or as it may be termed, surplus carbon) is forced through C into the top of the distilling chamber B, and upon the refractory filling thereof, through which it gradually works down. In doing so, it gives off its volatile parts, and undergoes a process of what may be called fractional distillation under the influence of the heated filling and of the hot water gas from the generator, which sweeps upward through the chamber B, and carries the vaporized oil with it into the chamber D, while the non-volatilized residue, after passing through the chamber B, falls upon the fuel in the generator, and becomes a valuable addition to it.

The patentees prefer also to inject a lighter oil into the head of the chamber D; this oil percolating downward into the direction taken by the water gas, and being gradually volatilized under the influence of the gas and of the heated filling of the chamber. The highly-carburetted gas is fixed in its passage through the chambers D D¹; but, as already stated, it is preferred that both these chambers, and also the chamber B, should be maintained at a temperature not materially exceeding that at which an oil gas of the maximum illuminating power is produced from the oils used. This temperature, it is remarked, is materially less than that employed in what is now recognized as good practice; and as a result, a smaller proportion of the oil or oils is converted into a fixed gas than would be the case were higher temperatures employed. Consequently, the gases issuing from the fixing chamber D¹ through the pipe L are loaded with a considerable quantity of condensable heavy oil; and, in order to save this oil in good condition for re-use, the gases are passed through surface condensers, to avoid admixture of water with the condensed oil, which, as is known, interferes with its profitable re-use as a carburetting fluid.

It is the oil collected in the seal-box P which it is preferred to inject into the distilling chamber B, using an ordinary oil of commerce in the head of the carburetting chamber D.

The method, and in some part the apparatus above described, by which the carburetting and fixing chambers are maintained at a temperature not substantially exceeding that at which oil gases of the maximum illuminating power are obtained, and in which a surface condenser is used for recovering the unfixed portion of the oil for re-use, are included in patent No. 24,005 of 1894, and are therefore not claimed in this application.

While, as stated, the patentees prefer to inject the heavy oil into the distilling chamber and a lighter oil into the carburetting chamber, they claim as their invention the injection of the same oil into both chambers; a pronounced advantage being gained in this case by the division of the oil supply causing a portion of it to travel against the gas current, and a portion with the current—thus obtaining more gasified oil for a given amount of uncarburetted gas and for the temperatures employed than would be otherwise practicable.

In case, owing to the tarry nature of any hydrocarbons introduced to the distilling chambers, a portion of the surplus carbon tends to cake upon the filling of the distilling chamber B, it can be removed (without loss) by stopping the supply of oil to the distilling chamber, closing the valve F¹, opening the valve F, and turning on steam through the pipe G¹. The steam passing downward through the distilling chamber will, under the great heat of the chamber filling, combine to a considerable extent with the carbon, producing gases which, continuing down through the fuel charge of the generator, will be further and completely decomposed; and the water gas resulting will pass upward to the head of the carburetting chamber D, where oil may be injected to carburet the gas. This treatment is advantageous also in regulating the incandescence of the fuel in the generator.

Supports for Incandescent Gas Mantles.—Arendt, M., of Berlin. No. 4984; March 8, 1895.

This invention relates to the glasses used with incandescent gas-lamps; the proposal being to divide them into two separate parts in order at the same time to serve as a support for the mantle, in place of the usual separate support rising from the burner. Furthermore, the introduction and removal of the mantle is facilitated by constructing the lamp glass of two separate parts; the upper part being secured to the lower by a metal gallery or other connecting device, which may (in conjunction with the lower part of the glass) also serve to support the mantle.

Chimneys for Incandescent Gas-Lamps.—Hirsch, E. F. W., of Radeberg, Germany. No. 5337; March 13, 1895.

The object of this invention is to so construct the chimney of an incandescent gas-lamp that its removal from the gallery or holder, except when the mantle has to be renewed, is unnecessary; also that the removal of the chimney can take place without shaking the mantle. This object is mainly attained by dividing the chimney horizontally into two or more parts; the lowest part being placed in the gallery or holder and supported thereby, while the other parts are fitted upon or in the next lowest part—the bottom part serving as a guide. The superposed part may serve the purpose of protecting the part placed in the gallery or holder against the direct influence of the flame; and this, says the patentee, is of special value when the gas-lamp is provided with a shade—the part surrounding the flame being visible to the eye. On the other hand, the superposed part may form only a continuation of the part placed in the gallery or holder; and therefore, when glass shades are used, it reaches up beyond them. In both cases, the removable part may rest on the fixed part; but in the first case, the removable part may rest on the gallery or chimney-holder itself.

Preventing Water-Pipes from Bursting.—Mark, J., of Newcastle-on-Tyne. No. 5497; March 15, 1895.

The patentee proposes to obviate the bursting of water-pipes through the action of frost, by inserting inside the pipe a tube of smaller diameter, through which hot air or hot water is forced or conveyed.

APPLICATIONS FOR LETTERS PATENT.

9070.—Moeller, J., "Incandescence gas-burners." May 7.
9082.—Hanauer, J. C., "Apparatus for use in the production of mineral gas." May 7.
9092.—Smith, J., "Liquid-meters." May 7.
9148.—Prince, F. O'C., "Application of gas-engine power to vehicles for propelling same." May 8.
9188.—Fraser, J., "System or process of heat regeneration and gas manufacture for internal combustion engines." May 9.
9301.—Duke, J. F., "Supplying gas to atmospheric or other burners." May 10.
9311.—Wright, J. R., and Veitch, W., "Reversing the directions of flow of gas or air in regenerative gas-furnaces." May 10.
9347.—Bow, J., "Fluid motors and pumps." A communication from J. Farquharson. May 11.
9506.—Crocker, S. H., "Radiant tissues for lamps." May 14.
9519.—Edwards, E. M., "Soldering iron for use with gas." May 14.
9538.—Cutler, S., "Fittings for water-gas washers." May 14.
9556.—Walker, C. C., "Washing and scrubbing gas." May 14.
9616.—Bennett, R. G., "Incandescent bodies." May 15.
9695.—Richardson, J. S., and Jevons, S., "Hand electric gas-lighter." May 16.
9730.—Armstrong, J. T., "Electric igniting apparatus for gas and oil lamps and burners." May 16.
9831.—Crocker, S. H., "Incandescent tissue for lamps." May 18.
9849.—Bell, R., "Automatic discharge trap for steam, gas, and other pipes." May 18.
9914.—Thomas, W. J., "Sun-burner gas-lamps." May 20.
9924.—More, D. M., and Lear, A. W. H., "Corrugated lead water-pipe." May 20.
10,008.—Harrison, J. D., "Gas and other explosive engines." May 21.
10,036.—Philpot, P. C. W., "Mantles for incandescent lighting." May 21.
10,075.—Wright, F., "Dry gas-meters." May 22.
10,083.—Tweedle, J., "Water-supply systems." May 22.
10,129.—Reeser, H., jun., "Mantles or luminous bodies for incandescent lamps, and compounds for use in their manufacture." May 22.
10,142.—Armstrong, J. T., "Electric gas-lighting devices." May 22.
10,145.—Guéguen, A., "Gas-retorts." May 22.
10,224.—Cutler, S., "Gear for controlling the valves of gas-generators." May 23.
10,229.—Glasgow, A. G., and Norcross, J. A., "Working plant for producing carburetted water gas." May 23.
10,268.—Richmond, F., "Joining lead pipe to iron pipe." May 24.
10,278.—Imray, O., "Manufacture of gases for illuminating and heating purposes from liquid hydrocarbons." A communication from E. Grey. May 24.
10,282.—Delire, J., "Regulating the passage of gas to water-heating apparatus for bath and other purposes." May 24.
10,287.—Kershaw, W. J., "Preventing the freezing of water in pipes." May 24.
10,307.—Newman, A. R., and Somerville, J. M., "Manufacture of illuminating gas." May 24.

Portsmouth Water-Works Company.—The half-yearly meeting of this Company was held on the 23rd ult. The report announced that the available balance on the profit and loss account was £17,025. From this the Directors recommended the payment of the full statutory dividends, and that a sum of £500 be allocated to the dividend arrears account, which, after the usual deductions, would leave a balance of about £2300 to be carried forward. The total number of premises now under supply by the Company was stated to be 35,786; and the average daily supply during the half year for all purposes was 5,930,000 gallons. The Chairman (Mr. W. Grant), in moving the adoption of the report, alluded to the prolonged frost, which, he said, was unprecedented in the history of the Company; the thermometer at the works having twice fallen 3° below zero. It had, of course, resulted in much inconvenience to the consumers; but it was considerably less than in many other towns. Regarding the suggested purchase of the works by the Corporation, he remarked that if they desired to acquire the property they must be prepared to pay a fair price for it. When the Company was started, there were considerable risks which had to be run by the shareholders. If the concern had turned out a failure, no doubt the Council, in the purchase, would have desired to have acquired it on the basis that it was a failure; but, on the contrary, the property was a magnificent success, and promised to be more so in the future. The motion was carried.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Proposed New Standard of Light.

SIR,—In your article headed "The London County Council and the Standard of Light," you very justly remark that "there would be no sense in asking Parliament to legalize a standard of light while there may be a dozen or more patterns of photometer to use with it, every one of them possibly capable of affecting the general result of the process." I am not without hope that you may yet be equally emphatic in favour of other amendments which are necessary to secure uniformity of testing. But, in the meantime, you say, after referring to the proposed new standard, that "we are in sight of an acceptable way of presenting the gas to it to be compared for illuminating power." In the discussion upon Professor Lewes's paper, "The Work of the Photometric Standard Committee," read before the Incorporated Institution of Gas Engineers (*ante*, p. 1061), I took exception to the proposal to introduce a method of testing by which injustice would be done to gas, the quality of which, as at present ascertained, exceeded 16 candles. It may be inferred, from Professor Lewes's reply, that the only difficulty in dealing with the matter in the way I proposed—viz., by testing all qualities of common gas with a chimney fairly filled with flame—is that it would be too advantageous to the gas companies. Hence the proposed new method of a fixed illumination "equal to the prescribed number of candles."

It is evident, however, that the desire of the Photometric Standard Committee was to remove from gas of a lower denomination the depreciating effect of an excess of air to the burner, from which it now suffers; and I would therefore suggest that, if it be too late now to adopt the method of testing I have advocated—the only method by which all qualities of common gas can be fairly tested—perhaps it is not too late to modify the recommendation of the Standard Committee by stipulating that the present 5 cubic feet per hour rate be not departed from, unless the gas should fall below 16 candles, when the quantity of gas should be so increased as to give this illumination. The operation of such a rule as this would leave the higher qualities of gas unaffected—*i.e.*, gas of more than 16 candles would remain as heretofore. It would not be shown of higher quality, as the method of testing with a chimney full of flame would show it to be; neither would it be depreciated in quality, as the method proposed by the Standard Committee would show; whilst it would remedy, in a great measure, the injustice which is now done to gas of low qualities, to which it is clear the Standard Committee is fully alive.

These remarks are intended to apply to the testing of London gas, with which the Standard Committee appears to have been chiefly, if not wholly, concerned; for clause 13 of the report, if applied to the testing of provincial gas, would lead to general confusion and great dissatisfaction in the numerous cases where corporations and companies are supplying gas of considerably higher illuminating power than is required by their Act. To compel such gas to be tested so as to give an illumination equal to that of the prescribed number of candles would be manifestly unjust, and in all probability would lead to an actual as well as nominal lowering of illuminating power in the provinces.

CHARLES HUNT.

Birmingham, May 30, 1895.

Water Gas at Tottenham.

SIR,—Mr. Travers wrote you last week, under the above heading, and raised points on the subject of carbonic acid and of water used. I cannot quite understand why he should need any further explanation about the former than was given in my paper. The paragraph following the analyses to which he refers states: "The third is a computation, based on the other two. It is given to show *approximately* what the constitution of the mixed gases would be after *complete* purification. As a matter of fact, the carbonic acid was not abstracted." My special reason for giving it was to show how comparatively unalarming the dreaded carbon monoxide would be in its maximum possible proportion in a 35 per cent. mixture. In the discussion, it was clearly brought out, in reply to Mr. Foulis's remark, that the carbon dioxide was registered and charged for. It therefore forms part of our 16½-candle mixture, and is not part of the unaccounted-for gas.

With regard to the water used, Mr. Travers would also have found, on reading through the paper, that the capital outlay includes the cost of a well, from which we are able to pump water free of charge. The expense of doing so is included in the boiler fuel, wear and tear, &c. But Mr. Travers makes his calculations on 67 gallons, though my paper distinctly states, with regard to the 57 gallons for the scrubbers and condenser, that it is cooled and re-used. This leaves only 10 gallons per 1000 cubic feet on which he should figure.

I am obliged to Mr. Travers for calling attention to these points, in case there should be other friends who have doubts upon them.

A. E. BROADBERRY.

Lower Tottenham, May 30, 1895.

Sloping Retorts at Brentford.

SIR,—In your last issue a correspondent complains that part of Mr. Husband's paper on "Sloping Retorts" was "meaningless and incomplete." The writer's letter also gives a reader a sense of incompleteness, for why should an "outsider," as he calls himself, want to know whether paying a royalty on a patent for gas stoking can be evaded? Surely, to an "outsider," whether royalty be paid or not is quite immaterial. But with an "insider," how very different the aspect becomes! All those who have followed the stoking difficulty for some few years will remember that the first "sloper" trial in England was made at the Southall works of the Brentford Gas Company, under Mr. Frank Morris, the Engineer, in 1889—first in an old brick-kiln, and then thoroughly in a small house. This test satisfied Mr. Morris, who extended the system into real work, and has continued it ever since. The first settings in the small house were shown by Mr. Morris freely to everyone, and hundreds visited the works from all parts of the world—New Zealand sending an engineer on one occasion.

To calm the troubled mind of the "outsider," let me assure him that the Brentford Gas Company have paid to the Automatic Coal-Gas Retort Company, Limited, all the royalties agreed upon; and all improvements or experience has been, as arranged, forwarded on to that Company, who are the present holders of the patents under which "slopers" are worked. Whether or not they are worth paying any royalties for, Mr. Husband's paper fully shows. He is working the moveable shoot connecting the coal-bunker with the retort mouth, for which I took out the patent.

I cannot understand anyone saying that a paper is meaningless when it describes a radical system of economy in money and in labour to the tune of about 50 per cent. Let an "outsider" consider that this economy means, in some instances, hundreds of thousands of pounds saved per annum, and even he will see that the paper must, if true, be an important contribution to the economics of both the gas and the public interest. It means at least 2d. per 1000 cubic feet; and to London that is not without meaning. Mr. Husband says that anyone can test or disprove his figures; and, from my knowledge of him, I think anyone will have difficulty in doing the latter.

Finally, as an Englishman, it strikes me that it is only just that such a labour-saving method as the one in question, which will inevitably displace the old brutal and cruel toil of hand-stoking, should be entitled to a royalty payment, if asked for. To an "outsider," in the City, it may appear that the non-worker should benefit from the worker's brains, and *not* pay for it. He is not alone in this view. But the State, in granting patents, also grants privileges. At all events, if anyone doubts whether the "sloper" system is worth paying for, let him take Mr. Husband's advice, especially in the present hot weather, and witness the "slopers" at work at Brentford, and then see the ordinary scoop work, and try a few turns of the latter. He will then, perhaps, exercise, an impartial and unprejudiced judgment, and be glad to remain an "outsider."

L. VAN VESTRAUT.

Chiswick, May 30, 1895.

SIR,—Not being a patent expert, I must refer Mr. Brackenbury to the Secretary of the Automatic Coal-Gas Retort Company, Limited, who, no doubt, will give him all the information he requires.

J. HUSBAND.

Brentford, May 31, 1895.

SIR,—I have read in your issue of the 28th of May the letter from a Mr. Brackenbury (who is, I believe, in the employ of the Continental Union Gas Company), and shall be glad if you will allow me space for a short statement on behalf of my Company.

The Brentford Gas Company have paid us royalty on every inclined retort erected at their works, and there has never been any question as to patent rights. On the contrary, my Directors have to thank the Engineer at Brentford for much valuable assistance in developing the Company's system. Mr. Brackenbury's insinuations are therefore quite groundless, and were, no doubt, written without due consideration.

C. J. ROBERTS, Secretary,
Automatic Coal-Gas Retort Co., Ltd.

Palace Chambers, Westminster, May 31, 1895.

South Staffordshire Water Company.—Preparations are complete for the early commencement of two large reservoirs, to be constructed at Barr Beacon, for this Company. Each reservoir will be capable of holding 8 million gallons.

The Guiseley Water-Works Purchase Question.—The Guiseley District Council considered *in camerâ* last Thursday a letter from the Local Government Board respecting their application to borrow money for the purpose of purchasing the Guiseley Water Company's plant. It was previously intimated that the Local Government Board had refused to sanction the purchase.

Staffordshire Potteries Water-Works Company.—The annual meeting of this Company was held at Hanley last Wednesday. The report which was submitted for adoption by the Chairman (Mr. J. F. Wileman) stated that the water revenue for the year (subject to voids and irrecoverables) was £36,471, against £35,566 in the preceding year; showing an increase of £904. The available balance on the year's profit and loss account was £16,100, which, with the addition of £1834 brought forward, made a total of £17,934. After deducting the interim dividend, a balance of £9264 remained. Out of this, the Directors recommend a dividend at the rate of 6 per cent. per annum for the half year ended March 25, making, with the interim payment, 6 per cent. for the year, and leaving a balance of £564 to be carried to the current year's accounts. The Chairman, in moving the adoption of the report, said he saw no reason to depart from the usual custom of congratulating the shareholders on the continued prosperity of the Company. It was true they carried forward a credit-balance diminished by £1300. But at the same time, the revenue had shown its usual elasticity; and they were able to report an increase of revenue of £904. During the last ten years, their gross revenue showed an increase of £7041. This was very gratifying, though it had not enabled them to increase the dividend. With regard to the diminished credit-balance, the loss of money through the frost had been heavy; but still he thought they must congratulate themselves that they had escaped so well. During the previous year, the net expenditure on repairs to mains, fire-plugs, &c., was £1317; while, owing to the severe frost, there was an excess of expenditure last year of £692. Unfortunately, this was not all, for the frost had compelled them to draw on all their resources at Hatton. They had to pump night and day in order to keep pace with the demand, for the waste of water was prodigious; and the working expenses at Hatton had been £1836, as compared with £1314, or an increase of £522. Then there was an advance in rates and taxes of £393; and, as they increased by £229 in 1893-4, they had an additional tax on their income of £622 in two years. These three items of extra expenditure alone amounted to £1607, which went a long way to account for the diminished balance. During the year, they had had applications to supply water to 1140 houses, 450 water-closets, 75 baths, and 70 meters for trade purposes. The report was adopted.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Private Bills down to the adjournment for Whitsuntide:—

Bill read a second time: Bridlington and Quay Water Bill.
Bill reported: Chesterfield Gas and Water Board Bill.
Opposition withdrawn: Rotherham Corporation Bill.
Bills Royal Assented: Hayward's Heath Gas Bill, North Middlesex Gas Bill, Scarborough Gas Bill, Whitby Water Bill, York New Water Bill.

HOUSE OF COMMONS.

The following further progress has been made with Private Bills down to the adjournment for Whitsuntide:—

Bills read the third time and passed: Ambleside Urban District Council Gas and Water Bill, Local Government Provisional Order (Gas) Bill.

A petition for inquiry into the management of the Metropolitan Gas Companies was presented from the Strand.

HOUSE OF COMMONS COMMITTEE ON LONDON WATER BILLS.

(*Before the Right Hon.* D. PLUNKET, *Chairman; Sir* J. KITSON, *Sir* H. STAFFORD NORTHCOTE, *Mr.* BALDWIN, *Mr.* BURNIE, *Mr.* MUNTZ, *Mr.* P. STANHOPE, *Mr.* AINSWORTH, *and Mr.* CHRIS. FURNESS.)

Seventh Day—Friday, May 24.

At the opening of to-day's proceedings,

Mr. BALFOUR BROWNE said that, in accordance with the suggestion of the Committee, the promoters would call the Parliamentary Agent of the London County Council to answer certain questions, more especially as to clause 6 of the Bill.

Mr. *H. L. Cripps*, in the course of his evidence, said that every Bill which had been passed since 1880 bore the marks of the results of Sir William Harcourt's Committee, and indicated the ultimate purchase of the undertakings of the Water Companies. Restrictions were placed upon the issue of capital in favour of the purchasers; and having considered the three alternatives of competition, regulation, or purchase, the County Council came to the conclusion that the latter was the fairest thing for the Companies, and the best in the interests of the consumers. He reviewed the proceedings on the various Bills introduced since 1880; and, passing on to speak of the arbitration clause, said there were two propositions with regard to every one of the directions. The first was to consider whether each matter should fairly and reasonably be taken into account in determining the price; and the second, whether, in the absence of some clauses of the kind, or some express power or direction given to the Arbitrator, the matter might probably not be taken into consideration by him. The witness was proceeding to explain the clause, when

Mr. LITTLER objected, saying that he did not mind Mr. Cripps stating what its intention was, but he did to his construing it. There was a great difference between what the Council intended to do, and the actual construction of the clause, which was a matter for the Committee to judge of themselves.

The CHAIRMAN said he saw no objection to Mr. Cripps stating what his intention was, and to his saying he believed this intention was carried out by the clause.

Mr. LITTLER was quite content that Mr. Cripps should go that length; but he urged that to say the clause did carry out that intention was going far beyond what was evidence.

Witness said he should not venture to say that, as he knew that sometimes clauses did not carry out the intention of the parties. The intention was that the Council wished the Arbitrator to have regard to certain matters. When he had done so, if he did not think them worth anything, he supposed he would not attach any importance to them; but if, having regard to them, he felt that effect ought to be given to them, then it was intended that he should give effect to them. As to directions to have regard to "the condition and state of repair of the reservoirs, filter-beds, filtration arrangements, wells, mains, pipes, machinery, and plant of the Lambeth Company, and the probability of future expenditure thereon, together with any liabilities or obligations in connection with their undertaking which the Lambeth Company may reasonably be required or expected to incur," evidence would be given by the Engineer; but, apart from engineering considerations, there were passages in the report of the Royal Commission which rendered such a direction desirable. As to the condition of the mains, since the Bill was drafted, there had been an absolute and complete breakdown of the whole distribution system within the area of the Lambeth and Southwark and Vauxhall Companies; and this was an element which, in some way or other, the Arbitrator ought to consider. Approximately, in a considerable proportion of the two Companies' districts, two-thirds of the houses had been left without water for at least a month. It was quite obvious that, if the undertakings were transferred to the London County Council, it would be absolutely impossible for them to have the mains and distributing arrangements in a position which would render it possible that there should be a repetition of such a breakdown. In his opinion, a special direction to the Arbitrator would be necessary to get that matter before him. The report of the Royal Commission indicated that there must be large additional expenditure on storage and filtration works; and the scheme of the Staines reservoirs was suggested. Supposing the Council were to put before the Arbitrator a claim to have considered, by way of reduction of purchase-money, either the probable obligation to make these new storage or filtration works, or to relay the mains throughout the district, the Companies might fairly answer that they did not care for the report of the Royal Commission, that they disagreed with it, and that they did not mean to make any of these works. In the transfer, they would have no other object than to get the largest possible price for their undertakings. They would have no future interest in the supply, and no future obligations to the consumers. The more they took this position, the more they would increase their claim for compensation, and ask to be compensated upon the basis of the last year's revenue without reference to any such obligations. Passing on to the next section of the directions to the Arbitrator—to have regard to "the legal powers of the Lambeth Company to take water, and the probability of such powers being limited"—he said this had reference to the question of the doubt which existed as to the legality of the agreements with the Conservancy to take water from the Thames in excess of the 20 million gallons a day granted by their Act. In addition to this, the Lambeth Company claimed to take some water which they pumped in proximity to the river. The soil in the neighbourhood of their works was porous; and, as the Engineer would better explain, they had, he believed, an arrangement by which, on their side of the bank, from a tunnel in the gravel, they pumped the water. They claimed the legal right to do this, because they were landowners; and every landowner could do what he pleased with his land. But the Royal Commission clearly indicated their opinion that the water so pumped must either be intercepted on its way to the Thames, or abstracted from the Thames; and therefore that it ought to be reckoned within the limits of 20 million gallons to which the Lambeth Company were restricted. The Southwark case was even more important; the contention on the one side being that they were limited to 20 million gallons, and on the other side that they might take 24½ million gallons. The fact was that they were actually taking a great deal more than the latter quantity. This was of importance, because if the legal powers of the Southwark Company to take water were what the Council suggested, they were at the present moment selling water which did not belong to them, and which they were not entitled to take at all. With respect to the Lambeth Bill, the Thames Conservancy, who were opposing, had proposed to the Council a clause which they wished to be submitted to the Committee, to the effect that the Council should not, under the powers of the Lambeth Bill, take, directly or indirectly, from the River Thames, or from any tributary thereof, or from or under any land within 500 yards of the Thames, a greater quantity of water than 24½ million gallons. So that the Committee would see that not only were the powers of the two Companies to take water very much open to question, but the risk that these powers would be limited on the application to Parliament of somebody or other concerned in the matter, was certainly not inconsiderable. Unless an Arbitrator had the fullest possible powers—in fact, almost the authority of Parliament—in regard to these matters, he (witness) did not see how the Arbitrator could take that into consideration. Witness quoted from the report of the Local Government Board on the Lambeth Company's Bill of this session the following paragraph: "The intakes of the two Companies at Long Ditton and Seething Wells have long since been discontinued as improper sources of supply; but the Board have recently been informed, by the Secretary of the Lambeth Water-Works Company, that that Company have no intention of abandoning their statutory right to make use of the intake at Seething Wells, and that, in the possible event of a serious accident occurring at the Company's intake at Molesey, or in the trunk mains at any point between Molesey and Ditton, it might be necessary, temporarily, to resume the intake at Seething Wells. The Board are of opinion that, if any precautionary measures are necessary to prevent accidents occurring at the intakes at Molesey, they should be taken by the Companies, and that neither Company should rely on their present statutory power to take water from an intake which has long been discontinued as improper for that purpose." He believed evidence could be given to show that, even at the present time, the intake was used occasionally, whenever convenient or necessary. But, at all events, it was a legal power of the Lambeth Company; and the probability of that power being limited ought to be taken into consideration by the Arbitrator. Why should the Company contend that they were able to increase the valuation by reason of the fact that they had a legal power to take in water at Seething Wells? Passing on to the next points of direction—"the adequacy and efficiency of the present sources of supply, and of the reservoirs, filter-beds, filtration arrangements, wells, mains, conduits, pipes, machinery, and plant of the Lambeth Company to meet their present and future requirements," and "the probable or possible necessity of the future introduction of a new source of supply, or new or improved works"—witness said these were engineering matters; but it was intended that the future obligations, whatever they might be, which would be imposed upon the Companies, if the undertakings remained in their hands, should be considered by the Arbitrator. Whether it became necessary to go far afield, outside the Thames Valley, for a new source of water supply, or whether it was sufficient to make the storage reservoirs at Staines, the fact that these suggestions had been made, and the prominence and force with which they had been offered, ought to be before any arbitration tribunal when deciding what the purchase price should be. These directions also related to the breakdown during the past winter, and would raise the question that the mains were so inefficiently laid near the surface that the obstruction of them by freezing necessarily followed, and was a matter which could, and ought to have been prevented by the Companies. But what the Companies would say without such directions would be: "What does it matter to us whether the mains are efficient or not? As long as we had our undertakings, we got our money." It might be true that, if the customer had resisted payment, and chosen to go perhaps up to the House of Lords, the Companies could not have recovered the water-rate for the period in which they supplied no water. *Primâ facie*, it certainly seemed that, where a Company was entitled to charge for a supply of water, it could have but little right to make a demand when the supply was not furnished. But there were difficult legal questions involved; and the Companies might fairly say they had their money, and would go on getting their money, as the people would not have resisted.

The CHAIRMAN: Do you mean that that is the way in which they would argue the matter before the Arbitrator?

Witness said it seemed to him that that line of argument would be open to them.

The CHAIRMAN: Then you do not mean—in this part of your evidence, at all events—to contend that they could not bring it before the Arbitrator at all?

Witness said that would depend upon the basis on which the Arbitrator proceeded; and practically they were agreed on both sides that there could be only one basis. The Arbitrator must take the gross income of the Company, and deduct from it all the necessary expenditure in the way of interest upon debt and cost of management. The Companies would say: "If such a system as we have at present yields us a certain income, we are entitled to be compensated on the basis of that income, and without reference to the fact that, directly the purchaser has paid us for our undertaking, he will be placed under the liability involved in making that system both adequate and efficient."

Mr. FREEMAN: In your opinion, would it be possible to raise these questions with the certainty of their being discussed, if there were not some direction enabling the Arbitrator to consider them?

Witness said he regarded the directions as necessary for this purpose. Proceeding to the next point—"the legality of the charges now made, or claimed to be made, by the Lambeth Company, and the reasonableness of such charges, having regard to the circumstances under which the powers of charge have been granted by Parliament"—witness again referred to many of the consumers not being able to get water for a long time last quarter. He said the question of the legality of the Company's charges in this respect would affect the net revenue; and it might be that the question would have to go to the House of Lords on a case stated by the Arbitrator, before he could deal with the point. Then there were also the disputed questions of the charges for baths and gardens; and in regard to this, he complained of the form in which the demands were made—comparing the demand-notes of the Lambeth and Southwark and Vauxhall Companies. The demand-note of the latter Company was, he thought, a fair and proper indication to the consumer as to what he was called upon to pay for, and was calculated not to result in illegal charges. In connection with the direction to consider the reasonableness of the charges, he said he should also consider the next point—viz., "the statutory power of another company to compete in any part of the Lambeth Company's district, and the rights of any other company or body to supply water in the Lambeth Company's district, whether as now existing under statute or otherwise, or as may be likely to exist in the future." It was essential to take into account what was the real position of the Companies in the peculiar circumstances of London, in order to deal with the question of how they ought to be treated in any arbitration. Witness laid before the Committee the history of the two Companies, and indicated their respective limits of supply, and the manner in which they overlapped with other Companies. He also compared the charges of the respective Companies in the districts where it would have been possible for them to compete. The London Companies were, he said, merely taking out of the Thames water which did not belong to them, and for which they paid nothing. If that water belonged to anybody, it belonged to the riparian populations below the intakes, or to the Municipality of London under the old grants. The authority representing London had, in fact, certain rights in the water of the Thames.

The Committee then adjourned till the following Tuesday.

Eighth Day—Tuesday, May 28.

Mr. *Cripps* was further examined to-day, and detailed to the Committee at great length the proceedings in 1851 and 1852, to show that Parliament contemplated that there should be competition between the Companies in certain districts. He maintained that in 1852, Serjeant Wrangham, on behalf of the Companies, gave a distinct pledge not only that there should be free competition, but that the rating powers given as a maximum would not be charged except in extreme cases, and that they would be "receded from in the majority, probably, of cases."

Mr. BALFOUR BROWNE: If, since that date, they have forgotten all about their pledges, and have charged their maximum, do you think they should be paid upon the basis of their absolute income, or do you think that the Arbitrator should consider their pledges?

Witness: I think the Arbitrator should consider whether he is to assume that an income derived from charging the maximum rate in all cases is one which he ought fairly to take into consideration; or whether he ought not, on the other hand, to give effect to the pledge of the Companies, and treat the statutory maximum income which the Companies might levy as from a rate which ought to be receded from in the majority of instances.

Supposing these Purchase Bills out of the way altogether, do you think there would be a reasonable probability of a public authority promoting a Bill saying: "You have forgotten your pledges; you are charging up to your maximum, and we ask Parliament to alter your maximum, and prevent your charging such high rates?"—Certainly; that is a point which has been very strongly pressed on the London County Council even now as a preliminary to purchase.

If this were done, of course that would limit the value of the undertakings?—Of course it would.

Mr. BIDDER: If Parliament passed it.

Witness proceeded to say that, if the Bills were rejected, and the Council introduced a Regulation Bill another year, this would be one of the main points they would bring forward on a Bill of that kind; and he hoped they would be able to substantiate it.

Mr. BIDDER protested that Mr. Cripps was going even beyond the province of a parliamentary witness, in professing to give expert evidence as to the probability of Parliament passing a Bill of a certain character if it were brought before them.

Witness said the contention of the Council was that all the circumstances he had mentioned were so far relevant to the value of the Companies' undertakings, and the proper price which the ratepayers of London should be called upon to pay for them, that they should be clearly within the purview of the Arbitrator, and that there should be no question as to whether or not he would be entitled to have regard to them.

Mr. BALFOUR BROWNE: The Committee appear to have an idea that an Arbitrator without any direction at all would be entitled, of his own will and pleasure, to take into consideration all these matters. Are you advised that it is not so?

Witness: I certainly do not think it would be so at all.

Mr. BALFOUR BROWNE: There is just one point I want to make perfectly clear, because I think it is in the minds of one or two members of the Committee. There are some of these matters that, by admission, an Arbitrator, even if he were not instructed, would consider. For instance, take the simplest case—the condition and state of repair of the reservoirs. He would consider this, whether he were instructed or not; or, at any rate, I think so. Why do you put into the clause the instruction to consider it?

Witness said that, as they were instructing the Arbitrator on other matters, it was desirable that this should be included; otherwise the Arbitrator might say that Parliament had not instructed him to inquire into it, and did not intend him to do so. Witness then proceeded to deal with the report of the Royal Commission, and to complain that the terms of reference were too limited, as they did not include the questions relating to outside sources of supply. He then went on to give the reasons why the Council had brought in eight Bills instead of one. Beyond the great differences that existed in the circumstances of the Companies, to which Mr. Harrison had alluded, he had considered the matter from the technical point of view as regards the probability or possibility of getting something effective done within the limits of one session of Parliament. There were so many totally different questions, geological and otherwise, of a very wide character involved in the cases of the several Companies, that to have grouped the whole of them together in the form of a single Bill would have rendered it quite impracticable to deal with them within the limits of a session. By dividing them, and proceeding with only the two Bills at present, the convenience of everybody was met, and unnecessary appearances saved; but the Council fully intended to go on with all the Bills.

Mr. BIDDER cross-examined the witness with regard to the composition of the Royal Commission, and elicited from him that the Council were quite satisfied with it. He then put it to the witness whether, the Commission having reported that there was plenty of water of high quality, this was not an end of the matter.

Witness said he did not agree with that interpretation of the report as affecting the two Companies under consideration. The Commission held, in regard to these Companies, that the provisions for storage and filtration were quite inadequate; and they suggested a scheme in order to remedy this and other difficulties which the London County Council were advised would be enormously costly, and exceedingly difficult to carry out. Properly interpreted, the Commissioners' report showed that, in some way or other, new sources of supply must be necessary. Admitting that water from some new source was necessary, there were two alternatives—the one to get it from a different point up the Thames; and the other to get it from a source outside the Thames Valley. He thought the Arbitrator ought to have regard to the liability which was obviously ahead of the Companies, even if the undertakings remained in their possession.

Mr. BIDDER: Then I should not be misrepresenting you in saying that, under those words, you want it open to the London County Council to argue before the Arbitrator that the Thames sources are inadequate, and that it would be necessary to go to Wales, or some other distant watershed, and that this therefore depreciates the value of the undertaking.

Witness said it did not depreciate the value; but he certainly did want the Arbitrator to consider the possibility of their having to go either outside the Thames Valley or to a different source inside.

Mr. BIDDER then cross-examined the witness on the history which he had given as to the anterior proceedings of Parliament, more especially on the question of the Companies having evaded the competition which had been authorized. He read to him a passage from the proceedings of the Committee in 1852 on the Southwark and Vauxhall Water Bill, in which the Committee pointed out "that there would be an advantage in the economy of the water supply if the two Companies—namely, the Lambeth Company and the Southwark and Vauxhall Company—were to unite and amalgamate into one Company," and that the Companies might find it advantageous thereafter to seek such an amalgamation.

Witness said he did not remember that particular paragraph.

Mr. BIDDER: Can you, with that paragraph before you, suggest that that Committee, in legislating in 1852, was relying, in the public interest, on the competitive powers of the Companies with each other?

Witness: Yes, I think so; because, of course, if this amalgamation had taken place, it would be subject to proper limitation of the charging powers of the Companies.

I do not quite follow. Your mind and mine seem to lie in quite different zones as to logic. How, if the two Companies were amalgamated, would the competition between them continue for the protection of the public?—The protection of the public might have been dealt with in another way.

Answer my question, What would have become of the competition between the two Companies if they had amalgamated?—The competition, of course, would have gone, and proper provisions would have been introduced for the reduction of the rates or charges.

Mr. BIDDER asked the witness whether he was aware that, as late as 1884, Parliament gave express power to the two competing Companies—the Lambeth and the Southwark and Vauxhall—to enter into agreements to avoid competition; and he read the 23rd section of the latter Company's Act of 1884, which provided for this.

Witness said he was aware of that section.

Mr. BIDDER: In which Parliament has expressly endorsed the action of parcelling out their district, so as to avoid competition.

Witness said he did not at all agree with Mr. Bidder about that. He thought the most important part of that clause was the proviso, which showed what was intended: "No such contract or agreement shall in any manner interfere with or affect the duties and responsibilities of either Company towards the consumers of water or the public, or the rights or interests of such consumers of water or the public, as against either Company."

Mr. BIDDER: Why is that more important than the operative part of the clause, which says that they may enter into agreements to parcel out their district?

Witness: We thought that, subject to this proviso, there was no great

harm in the Company getting what seemed to be a purely domestic power.

I am only drawing your attention to it as an extension of the policy of 1852, which was that they were not compellable to compete in each other's district?—I do not agree with that at all. I think the proviso is the important part. Though the Companies were allowed to carry out purely domestic arrangements between themselves, it was expressly provided that no such contract or agreement should in any manner interfere with or affect the duties or responsibilities of either Company towards the consumers of water or the public.

Notwithstanding that, you ask that the Arbitrator should be authorized and instructed—in fact, ordered—to have regard to these matters as affecting the value of the undertaking?—We ask that he should have regard to them.

And, of course, affecting it in the sense of diminishing the value?—I think it probably would have that effect.

Have you any doubt about it?—Yes; I do not agree with the way in which you put it. It is intended that we should be able to argue that the Arbitrator is not to proceed upon the basis of your present income, which is derived from the exercise to the full of your maximum powers of charging. Clause 3 of the present Bill is intended to amend the Companies Act of 1852, and to repeal the last proviso of section 47 of that Act, as the Council considered the time had arrived when it should be repealed.

Just consider. This cannot be *bonâ fide* legislation, you know, because, inasmuch as this is a Bill to take the property out of the hands of the Companies, there can be no question of their being hereafter called upon to lay down mains in a competing district?—Of course, it is possible that Part II. of this Bill might pass alone; I do not know whether the Committee are likely to pass it.

Is it possible? I ask you, as a Parliamentary Agent, is it possible?—I think it is possible.

Is not this essentially a Purchase and Transfer Bill? Is not that its scope?—Yes; I think so.

Then if that Bill passes, and the Southwark and Vauxhall Company's undertaking is transferred to the London County Council, there is no more Southwark and Vauxhall to compete or supply water, or do anything?—That would be so.

Therefore there can be no *bonâ fide* idea of legislating with a view to compelling the Southwark and Vauxhall Company to lay mains in the future?—That would be so.

Is not the simple and sole object of the introduction of clause 3 in the Bill to cut down the purchase-money of the Southwark and Vauxhall Company?—Well, I think it would have the effect of reducing the purchase-money which the Company might otherwise claim.

Is not that the only object with which it is introduced?—Well, I tell you it was not the only object with which it was introduced.

What other object do you suggest?—Because it was thought, when the Bill was framed, that it was possible, in the development of the case, that Part II. might be proceeded with, and no more.

So that, in the event of your not being able to purchase us, you might give us a kick as we went out of the door?—No; rather that we should give the consumer a right to have water at a price at which he really ought to have it, and at which you prevent him from having it.

And do you present it to the Committee as a reasonable and fair and admissible thing, when you find in the Act of the Company you propose to take compulsorily a proviso of a protective character which adds to the value of their undertaking, to ask Parliament, in your Purchase Bill, to repeal that proviso, in order that you may cheapen the thing you are buying?—I can only answer that by saying that the Council thought that the time had arrived when the proviso ought to be repealed, and that then, if they could justify its repeal to the Committee, the Arbitrator would, of course, have to take into account, or would have regard to, the effect of that repeal.

And, by one of those curious coincidences that do sometimes happen, the time had arrived for cutting down our protection simultaneously with the purchase by the Council?—Well, the Council thought it really was not reasonable, in all the circumstances of the case, that you should go to an Arbitrator starting upon the basis of being entitled, or claiming that you were entitled, to the largest income which you could get by exercising your full maximum powers.

Mr. BIDDER put before the Committee an observation by Sir W. Harcourt, as Chancellor of the Exchequer, in 1883, in which he said: "I cannot myself accept the proposition that you can deal with the Water Companies, or any other persons, by simply repealing their rights, and making their rights what you choose them to be;" adding that it looked very like that which the Council were now proposing to do.

The CHAIRMAN asked on what occasion that observation was made.

Mr. BIDDER said it was in answer to a deputation on the question of the London Water Companies' charges.

Ninth Day—Wednesday, May 29.

At the sitting of the Committee to-day, Mr. Briggs Priestley (Pudsey) took his seat in lieu of Mr. Christopher Furness, who had been discharged.

Mr. *Cripps* was further cross-examined by Mr. BIDDER as to the pledge which he stated Serjeant Wrangham had given in 1852, which the witness said was not a pledge that they would reduce the rates, but that they would not charge the maximum rates they were then asking to be empowered to charge.

Mr. BIDDER: You say that they had broken those pledges, and that therefore Parliament ought to remedy the breach of faith and punish them by a compulsory reduction of their rates?

Witness: No, I do not say that; but I say that that particular complaint should be brought under the consideration of the Arbitrator.

Surely if the Companies have given pledges to Parliament, and have broken those pledges, Parliament is the proper authority to rectify that want of good faith?—I agree that there is a good deal to be said in favour of an application to Parliament to reduce the charging powers of the two Companies.

The year 1852 is a good many years ago. How many times have all these Companies been to Parliament since then? May I say scores of times?—A good many times.

And on all occasions—at least every recent one—either the County Council or the Metropolitan Board of Works, their predecessors, have been petitioners, and have been discussing the adjustment of those Bills?—They have. The Metropolitan Board were not always present because——

They were minding their own business, perhaps. But the Companies' rates have been before Parliament since 1852?—There has never been any complete reconsideration of their charging powers.

Has the London County Council or the Metropolitan Board of Works, or anybody else, on any one of these numerous occasions, ever suggested that there had been any breach of faith or departure from pledges given in 1852?—I do not know. I do not think the question has ever been raised. There was limited protection given, of course, in many of the Acts, with reference to the raising of future capital.

Mr. BIDDER then cross-examined witness as to the arbitration clause; and asked if he meant that the Arbitrator should inquire into the question, and ascertain whether the Companies' sources were sufficient, and their charges legal or illegal.

Witness said he did.

Mr. BIDDER: Do you propose at all before this Committee to give evidence, and go into the question of whether our charges are legal, for instance; or are you going to leave that to the Arbitrator?

Witness: Of course, the length of this inquiry is rather limited by the period of the session. I do not think we propose to do more than suggest to the Committee what we hope will be sufficient reason for making it clear that the Arbitrator should have power to consider those matters.

Mr. BIDDER: Then it is for him to decide those questions, yes or no?

Witness assented.

The CHAIRMAN: You say it is for the Arbitrator to decide yes or no. What do you mean exactly by that?

Witness: I do not think it is the intention of the clause that the Arbitrator should take the place, as regards legality of charges, of a Court of Law. He should be empowered to inquire into, and have regard to, the question of legality; but if he desired a decision as to the legality of a particular charge, I do not think there is anything in this clause which is intended to enable him to give one on his own account. It would rather have to go to the Courts to decide first of all the question of legality.

Mr. BIDDER: Then, inasmuch as you do not propose to give evidence before the Committee, and you leave it to the Arbitrator, why do you ask this Committee to decide the question off-hand against us?

Witness: We do not ask the Committee to decide any question off-hand against you.

But you say in your preamble—"And whereas the Southwark Company have exhausted the powers of drawing water from the Thames conferred on them by Parliament, and cannot legally and efficiently supply the requirements of their district, and have charged, and are charging, the consumers of water in their district rates for the supply of water drawn by the Southwark Company from the River Thames in excess of their legal power?"—I think, having regard to the course which we have now taken in this matter, that the recital in the preamble goes farther than we intend to prove before the Committee. It might be contended on the part of the Council that this is not so.

Allow me to draw your attention to this: In your Bill as deposited (and not a word has been suggested up to this moment as to withdrawing or altering any portion of the preamble—it has passed *sub silentio* until this moment), not only is that placed in the preamble, but is given as the reason why it is desirable to transfer to a public authority. You say there that as we have exhausted our powers and "cheated" the public (you do not use that word, of course) by charging in excess of our powers, and our storage is insufficient, it is expedient we should be transferred to the London County Council; so that you are actually proposing to take this Bill in a form which would condemn us as a Company who were at the end of their tether as far as water was concerned, and send us before an Arbitrator who is to take that into consideration, and that we had been convicted by Parliament of that offence. That is really what you have been proposing to this Committee to-day?—Yes.

And then you make a pretence, in clause 7, of leaving it as a matter for the consideration of the Arbitrator.—I have already explained to you that, in my opinion, having regard to the course which we are now taking with this Bill, we should not give evidence which would justify the paragraph of the preamble in that form.

So I gather, and so I expected all along; but you never suggested to the Committee that you would not ask them to pass the preamble in that form. Now, dealing with that general principle of the clause, is that the general principle on which water companies and undertakings have been transferred; and is not the Ambleside clause the ordinary form adopted?—I do not think there is any ordinary form, or anything that you can call one ordinary form over another.

Continuing, witness said that he would prefer the Northwich clause to the Ambleside clause. Under the Northwich clause, the Arbitrator would have to consider what was the value of the undertaking to the purchasers rather than to the sellers. That surely expressed what the Council sought to provide for in this case. They did not want to buy this undertaking as if it was sufficient for all purposes and all time, and then to have to add to that the cost of making it efficient. In the first instance, the real question was whether the income which the Company were getting, on which they claimed to be compensated, was a legal, reasonable, or proper income. He doubted very much if the Arbitrator would be bound to go into the question of whether it was a legal income, if it was raised.

Mr. BIDDER: Do you suggest that if, as a matter of fact, we have been getting our income by cheating the public, it would not be open to the County Council to show the Arbitrator that we were making improper charges, and that our income confined to our legal maximum would be so much less?

Witness: I have already said, in answer to a similar question, that I think it would be very difficult to contend that an Arbitrator would not take that fact into consideration, provided he is in a position to ascertain the exact questions of legality or illegality.

In further cross-examination, witness said he did not think the Arbitrator would be able, without the directions, to take into consideration

the condition and the state of repair of the reservoirs; but he would accept Mr. Balfour Browne's legal opinion, when he said that the Arbitrator would consider such a matter without any special direction. The question was whether the Arbitrator would have to consider the condition and state of repair of the reservoirs as involving a future liability on the Companies. Of course, if the undertakings were remaining in the hands of the Companies, they would from time to time have to execute repairs to their reservoirs; but after the whole of the undertakings had been transferred bodily, as proposed under these Bills, to the London County Council, there would no longer exist any liability on the Companies to repair their reservoirs in any way.

Mr. BIDDER: If it were a purchase under the Lands Clauses Act, none of these difficulties would arise; but you are really suggesting to the Committee that, because you have chosen to put your Bill in the abnormal form of taking the concern before you assess its value, an Arbitrator might be shut out from considering what the outgoings were likely to be and the repairs. Do you really suggest that seriously?

Witness: Yes; I suggest it is a thing that ought to be carefully considered with reference to this particular case. There were difficult questions connected with the state of the mains which differed from those in connection with the condition of the reservoirs; and I maintain that the Arbitrator would not necessarily go into the condition and state of repair of the pipes. The breakdown during the last winter clearly exemplified the importance of that particular matter.

May I ask you, has the late winter changed the law?—No; but it has given a very effective illustration.

You have asserted, as a proposition of law, that though an Arbitrator under the Lands Clauses Act can inquire into the condition of the reservoirs, he cannot inquire into the state of the pipes. Now I ask you, have you any authority whatever—text-book, or decision, or opinion of Counsel—to support that proposition, because it is an astounding one to us. I venture to assert, challenging you as a lawyer, that it has no foundation whatever?—I cannot say anything more about it than that. At the present moment, this Company, with its mains in the condition in which they are, are able to divide a certain income. The reason why they can divide that income is this: They have not spent the necessary amount of money in putting the mains into what we should consider a proper condition. Had those mains been so laid as to be perfectly secure against any interruption by means of frost, further capital must have been spent; and there must have been a further deduction by way of interest before the net income of the Company available for dividend was arrived at. At the present moment, notwithstanding all that, the Company is dividing a certain income. They have taken the risk of the thing. This last winter may have upset all their calculations. I do not know; but the Company have taken the risk of that, and therefore are able to divide a certain income. Now, it is not fair we should have to buy the Southwark and Vauxhall undertaking on the basis of the income divided among the shareholders, unless you take into account the fact that the mains are so laid that an immediate large expenditure upon them would be proper, even if the concern were left in the hands of the Company, and will be absolutely essential directly it is transferred to the Council.

The CHAIRMAN: But supposing it is so, what is to prevent the Arbitrator from going into that question quite as much as into the condition of the reservoirs and filter-beds?

Witness: I think, Sir, that the Company would submit to the Arbitrator: "Whatever you may say about the condition of these mains does not affect us. The mains are in such a state that we have always got our income."

My question is not as to what conclusion the Arbitrator would arrive at. He might agree with you, or he might not; but what is there to prevent him going into the question, if it is submitted to him, just as much as going into the question of the reservoirs and filter-beds, which you have agreed he could go into. I do not say what conclusion he would arrive at; but why should he not consider it?—My notion is that there is this reason: The Companies would claim that their purchase-money must be based on a certain number of years' purchase of their divisible income.

Mr. BIDDER: I quite agree with you; no doubt it would be so.

Witness: Yes, that would be so; and I doubt very much whether, in the absence of some direction, an Arbitrator could consider the fact that the mains are in such a state that it certainly is reasonable and proper that they should be relaid at a much greater depth.

The CHAIRMAN: But would not those be some of the circumstances of the case under the earlier part of the clause?

Witness: I rather doubt it, Sir. We certainly think that it is an element which ought to be taken into consideration; and if that is the case, it would be well that it should be clearly indicated.

Sir JAMES KITSON: The question we really want you to answer is this: Can you give us an instance where an Arbitrator has not taken into consideration the question of the pipes, and the condition of the pipes and services? Can you give us such an instance?

Witness: No, I do not think I can. I can, of course, point the attention of the Committee to more than one case where, for one reason or another, it has been thought necessary to put the Arbitrator in a different position to that in which he would be under the Lands Clauses Act, for instance.

Mr. BIDDER asked witness if he had any other of those instructions which he ventured to tell the Committee the Arbitrator would not be entitled, without instruction, to take into consideration under the Lands Clauses Act.

Witness referred to the clause—"Any liabilities or the obligations in connection with their undertaking which the Southwark and Vauxhall Company may be reasonably required or expected to incur." Those liabilities must depend, in a great measure, on the probabilities of future action on the part of Parliament.

Mr. BIDDER asked witness if he did not know that Arbitrators did take into consideration questions of that kind, and had done so over and over again without express power being given to them.

Witness said that he had already explained that the circumstances in this case were unprecedented; and therefore he considered the direction justifiable. Dealing with the question of back dividends, he based that upon the precedent of the Gas Companies; but he admitted that there was no parallel between the cases of the Water Companies and the Gas Companies. On the clause instructing the Arbitrator not to take into consideration any increase in rateable value, he said that he thought there was no reason why, because the requirements of London increased the rateable value of property, Londoners should on that account have to pay more to the Water Companies for the rights which they proposed to acquire from them. He did not think it was at all likely, as the outcome of the Transfer Bills, that the County Council would become the owners of three or four of the undertakings and not of the others; but he contemplated it as a possibility. Even if that were so, he did not think the County Council would be in a position, as a competing Water Authority, to bring the outstanding Companies to their knees by competition.

In reply to the CHAIRMAN, witness said that he had not in his experience heard any complaints made by either of the parties to an arbitration where an appeal to a Court of Law had been refused them by an Arbitrator; nor was there any instance where the right to make up back dividends had been withdrawn or limited.

In cross-examination by Mr. LITTLER, witness said that the Council had not been advised as to the total cost of buying all the Companies. The Council had not been definitely advised that the adoption of the arbitration clause would have the effect of cheapening the undertaking; but their object was to fix a fair and reasonable figure.

Before witness's cross-examination had concluded, the room was cleared; and on the Counsel and parties again being called in,

The CHAIRMAN stated that the Committee desired him to suggest that the course pursued by Counsel for the promoters of the Bill had gone rather upon the principle of arguing, first as to the importance of the various matters contained in the arbitration clause, and, secondly, as to the necessity for their being set out in the clause in order to bring them to the consideration of the Arbitrator. They thought that, at the present stage of the proceedings, it would be better if the clause were rather reversed. It seemed to him that the stronger the case which might be made as to the importance of the various matters referred to in the clause, the more probability there would be that they would be entertained by the Arbitrator, if he had a power of entertaining them at all. The Committee would like to hear more evidence in support of the view that it was necessary to give special instructions, in order to have those matters brought to the knowledge of the Arbitrator.

Mr. FREEMAN said, after Mr. Cripps's evidence had been concluded, the promoters would direct their evidence specially to that point.

The Committee then adjourned till the following day.

Barnsley Corporation Water Bill.

Excepting the inquiry into the question of transferring the London Water Supply to the County Council, the consideration of the Bill of the Barnsley Corporation, to enable them to obtain an additional supply of water and extend their present area, has been the most interesting feature of the projected water legislation of the present session. The new sources desired by Barnsley were the Hogg Brook and other tributaries of the Little Don, which it was supposed would furnish the borough with an admirable supply of water for the next fifteen or twenty years. But other Local Authorities had an interest in the coveted watershed; and the scheme was stoutly opposed—Sheffield Rotherham, Doncaster, and Wakefield being in the forefront. The Bill was referred to a Committee of the House of Lords, presided over by the Earl of Jersey; and they had it under consideration for about a fortnight. The promoters were represented by Mr. Pope, Q.C., Mr. Pember, Q.C., Mr. Page, and Sir G. Morrison; the opponents, by an array of Counsel comprising practically the rest of the Parliamentary Bar. The fight was brought to an end last Tuesday, when the Chairman intimated that the preamble of the Bill had been proved, subject to certain modifications as to clauses. These were made on Thursday; and the Bill is now waiting to be reported. Owing to great pressure on our space during the past few weeks, it has been impossible to report the proceedings in Committee. But an early opportunity will be taken of doing so; or, if not, the subject will be dealt with when the Bill reaches the House of Commons, where, we understand, the opposition is to be renewed.

The Llanberis Water Company's Provisional Order.—At a recent meeting of the Gwyrfai District Council, communications were read from the Parish Council of Llanberis, stating that they had decided to oppose the application of the Llanberis Water Company for a Provisional Order, on the ground that the Order did not include the suggestion made by Colonel Yorke, one of the Board of Trade Inspectors, that the storage capacity should be increased. In the absence of this, the Council maintained that the Company could not possibly provide an adequate supply for the town. Objection was also taken to the increase in the Company's rate of charges. The District Council were urged to aid the Parish Council in their opposition; and an undertaking was given that the whole expense would be borne by Llanberis. It was decided that the District Council should assist the Parish Council in opposing the Bill conditionally upon the expense being declared special on Llanberis, and that the expenditure did not exceed £200 without further authority.

The Finances of Ilkley and the Gas Undertaking.—Consequent on the severe and prolonged frost of last winter, the expenditure of the Ilkley District Council exceeded their income; and, as a result, at the last meeting, the Chairman of the Finance Committee moved that the general district rate should be increased to 3s. 2d., and that the water-rents be 1s., instead of 10d., in the pound. Mr. Horsman (who is Chairman of the Gas Committee), moved an amendment that the rate be 3s. in the pound, and the water-rental 10d. In doing this, he stated that the Gas Committee had a surplus on their undertaking, of which he proposed that £629 should be transferred to the district fund account, and then the district rate and water-rentals could remain as they were. This was seconded. Mr. Dobson protested against the district rate being relieved at the expense of the gas consumers; but Mr. Dilby said he would agree with Mr. Horsman if he would undertake that there should be a reduction in the price of gas. This Mr. Horsman promised at the close of the current quarter; and the amendment was thereupon carried.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Thursday, May 30.

(*Before Mr. Justice* STIRLING.)

Humphreys and Glasgow v. Samuel Cutler and Sons.

This was a motion for an injunction to restrain the defendants from using in any way, in the construction of water-gas plant, or otherwise in connection with their trade or business, any drawing or plans copied or otherwise prepared by or under their directions from plans and drawings furnished to them in confidence by plaintiffs, or from using or communicating to any person the information obtained from such plans or drawings.

Mr. GRAHAM HASTINGS, Q.C., and Mr. ASHWORTH JAMES appeared for the plaintiffs; Mr. BUCKLEY, Q.C., and Mr. WILLIS BUND represented the defendants.

Mr. GRAHAM HASTINGS stated the case on behalf of the plaintiffs as follows: In 1892, some correspondence took place between the parties, with a view to the defendants undertaking the manufacture of the plant designed by plaintiffs, and supplied by them to gas companies for the production of carburetted water gas; Messrs. Cutler and Sons desiring to be associated with the plaintiffs in their undertakings, and, if possible, to become sole manufacturers of the ironwork required by them. The plaintiffs, however, declined to enter into any specific arrangement of this kind, but desired that the defendants, in common with certain other manufacturers, should tender for the supply of the plant wanted from time to time. Reference was made in this correspondence to the desirability of the plans and designs prepared by the plaintiffs being kept secret; and the same point was pressed in interviews. Ultimately, in April, 1893, drawings were forwarded to the defendants, with a view to their submitting a tender, with a request to return the drawings with the tender. The defendants sent in their tender on the 1st of May, but did not return the drawings. On the 5th of May, the plaintiffs informed them that their tender was not accepted; and they asked for the return of the drawings, which defendants sent back on the 9th. They had, however, made copies of these drawings; and, in March of the present year, the plaintiffs heard that these drawings had been used by the defendants in preparing plans for plant for the Hornsey Gas Company, for which the defendants had obtained the contract. Thereupon a writ was issued, and notice of motion served. The defence set up was that it was usual, in such business, to make copies of all plans on which tenders were sent in; but he (Mr. Hastings) did not understand defendants' witnesses to say that this was the case where the drawings were confidential, or where there was a stipulation that they should be returned. It was also set up by the defendants that they had not derived any information from the drawings in question, having full knowledge of the details of water-gas plant themselves from other sources. But even if this were so, it did not justify the course taken; because the copies being made might get into the hands of other people, who had not that knowledge, and who would thus be enabled to make use of plaintiffs' knowledge to their detriment.

The evidence was then read at considerable length; the principal witness being a Mr. Lovell, who went into the service of the defendants as a draughtsman on or about March 30 last, and communicated to a friend of his, who was in plaintiffs' employ, the fact that drawings with the names of the plaintiffs upon them were being used in preparing the working drawings for the Hornsey Gas Company's plant, and subsequently, at his friend's request, furnished him with a list of them.

The evidence on behalf of the defendants, consisting of affidavits by Mr. Cutler and by several of his draughtsmen and assistants, was to the effect that Mr. Lovell was not found to be a skilled draughtsman, though very efficient in tracing, and that the plaintiffs' drawings, as well as others in the office, of works executed for The Gaslight and Coke Company at Beckton and Kensal Green, were simply put before him to assist him generally in showing how he was to prepare those on which he was at work. But that the whole of the plans and dimensions were prepared by Mr. Cutler, his consulting expert, Mr. Arthur E. Broadberry, and Mr. Hodgkinson, his chief draughtsman, entirely without reference to the plaintiffs' drawings; Mr. Cutler saying that he was not even aware of the existence of the copies in question until he made inquiries after the writ was served. There was also evidence on each side by engineers as to the practice of the profession with regard to making copies of drawings.

Mr. BUCKLEY also read a letter from defendants' Solicitors, dated May 1, to plaintiffs' Solicitors, after the motion had been first mentioned in Court, offering to give up the whole of the copies in the defendants' possession, and saying that they were not, and never had been, of any use to the defendants. On the 7th of May, they received a reply from plaintiffs' Solicitors declining the offer, and saying that the matter, having gone so far, would have to be proceeded with. He then addressed the Court on behalf of the defendants, who, he said, repudiated with indignation the charge brought against them of having made an improper use of the drawings sent to them, and submitted that no case whatever had been made out.

Mr. WILLIS BUND followed, and pointed out that, if the defendants had really intended to make an unfair use of the plaintiffs' drawings, they certainly would not have put the plaintiffs' names upon them, nor would they have put them into the hands of Lovell, a comparative stranger, who, he suggested, was a spy sent by the plaintiffs, in consequence of defendants having obtained a contract from the Hornsey Gas Company.

Mr. GRAHAM HASTINGS, in reply, contended that the evidence showed that there had been an improper use of the drawings, and that the plaintiffs were entitled to an injunction.

Justice STIRLING, in giving judgment, said the case was launched in a way which caused it necessarily to present some painful features; and the attitude taken up by the plaintiffs prevented any settlement of it on the present occasion. The charge made against the defendants was one of gravity, and required investigation at the trial. Therefore, he need say no more than was necessary for the purpose of dealing with the present application. Having stated the injunction which was asked for, he said, without going through the correspondence and the tender on which the defendants were supplied with certain copies of machinery to be erected by the plaintiffs, it seemed to him that the plans furnished to the defendants were communicated to them in confidence; and what the defendants did was, having received these plans, to make copies and keep them. They said the reason they did so was, in substance, their desire to preserve a record of the work for which they tendered. They retained these copies after the tender had been refused; and, further than that, it appeared they used them for the purpose of instructing one of their servants—Mr. Lovell—to make certain working-drawings. It seemed to him that, so far, the case was uncontradicted; and the defendants were found to have made a use of the drawings in question which was not justified. With respect to this, they offered at once, without any question to deliver up the drawings, and that would put an end to any future use of them. The only question was whether he ought to exact an undertaking or grant an injunction beyond that. The allegation, or suggestion, on the part of the plaintiffs was that these drawings were made use of, not for the purpose merely of instructing this particular servant in the way mentioned, to make working-drawings, but that, in substance, they were used for the purpose of preparing a tender in competition with the plaintiffs. Upon this point, it seemed to him, as the evidence now stood, that the case was not made out. He would not go into it in detail, but it appeared to him that, on the evidence adduced, he ought not to come to that conclusion. No doubt the case was one which would deserve serious investigation at a later period; but he was not prepared at the present moment to come to the conclusion that these plans were used for the purpose of the tender. He thought, therefore, without prejudice to any question, the undertaking of the defendants to deliver up the copies they had kept ought to be accepted. As regards the rest of the motion, he would not make any order; and the costs would be costs in the action.

Mr. BUCKLEY asked his Lordship to specially reserve the costs since the 1st of May, when the defendants offered to return the drawings.

Ultimately his Lordship decided he would reserve all costs.

A further discussion ensued as to the copy which was alleged by the plaintiffs to have been made by the witness Lovell, but which Mr. Buckley, on the part of the defendants, asserted was not a copy of the plaintiffs' drawings.

His LORDSHIP said he thought, as these drawings were copied from those supplied by the plaintiffs, the defendants ought not to make use of them.

Mr. BUCKLEY said he would give an undertaking, on the part of the defendants, not to use them so far as they were copied; it being thoroughly understood that the defendants alleged that they were not copied at all.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Thursday, May 30.

(*Before Justices* DAY *and* WRIGHT.)

The Queen v. The Colne Valley Water Company.

In this case, a rule *nisi* had been obtained by the Crown for a *mandamus* in reference to a supply of water by the Company.

Mr. CHANNELL, Q.C., and Mr. SUTTON appeared to support the rule, which was opposed by Mr. FINLAY, Q.C., and Mr. GLEN.

Mr. FINLAY said he appeared against a rule obtained by Mr. Channell, calling upon the Colne Valley Water Company to show cause why a writ of *mandamus* should not issue commanding them to supply Daniel Swift with water for domestic purposes by measure, and to supply a meter for the purpose. The applicant relied upon a certain clause in a Provisional Order, confirmed by Act of Parliament, with reference to the Alperton and Sudbury water undertaking. This was transferred to a Company called the Central Middlesex Company, and the Central Middlesex Company's undertaking was purchased by the Colne Water Company in 1894. The purchase was confirmed by Act of Parliament under a schedule, in which was contained the agreement of purchase. Shortly put, the question raised upon the application was whether the Colne Valley Water Company were now bound, in respect of the district taken over by them in the Act of 1894 confirming the purchase, and whether they were bound to supply water under the terms of their own Act, or under those of the Order relating to the Alperton and Sudbury district. The Act of 1894, it would be submitted on behalf of the Company, gave the answer to this question; and really the *mandamus* was not the proper remedy for the applicant.

Justice WRIGHT: What is the regular remedy?

Mr. FINLAY said he was told that the applicant should have proceeded for a penalty under section 43 of the Water-Works Clauses Act, 1847. At that time, the Company were quite content to argue the question as it was raised on the rule obtained by Mr. Channell; and they would submit that the obligation did not exist upon their part. The Company therefore had no objection to the regularity of the present proceedings, and were content to argue the rights of the parties as they were. The Act of 1894 was one authorizing the Central Middlesex Water-Works Company, Limited, to sell and transfer a portion of their supply to the Colne Valley Water Company; and the Alperton and Sudbury Water Order of 1884 provided for the supply of the residents in the district.

Justice WRIGHT: In regard to a *mandamus*, ought we to grant one if we cannot proceed to its enforcement?

Mr. FINLAY: I do not think any enforcement would be necessary, if the opinion of the Court were against us.

Justice WRIGHT inquired what would happen in that event.

Mr. CHANNELL: The Directors would have to go to prison if they did not obey the order.

Mr. FINLAY said his friend apparently wanted to proceed to extremities at once; but if their Lordships would allow him to keep to the

question of liability, he would proceed to explain the Act of 1894. The first section he would allude to was that having reference to the Order of 1884, which provided that the undertakers might supply water to the district of Alperton and Sudbury. There were certain further details which he need not read then; and the fourth section of the Act confirmed the agreement of Dec. 30, 1893, entered into between the Central Middlesex and Colne Valley Companies. Put shortly, it was an agreement for the sale of this portion of the concern to the Colne Valley Company, who were to supply the district surrounding and adjoining it, so that it should be conveniently put into one set of hands. The undertaking was to sell by the terms of the agreement to the Colne Valley Company, and for the future to carry on the works. Section 4, sub-section 3, contained the enactment that, after such transfer of the powers, the obligation of the Limited Company to supply water ceased. Section 2 gave the limits of the Colne Valley Company for the supply, including the transferred area, and subject to the provisions of the Act. This section dealt with the privileges and obligations of the Company, and Counsel submitted that it really decided the question before the Court. It provided, subject to the provisions of the Act, that the powers and liabilities contained in the Colne Valley Water Company's own Acts should apply to the transferred district, and that district was to form part of the area for the purposes of the Act. He did not think it could be said there was any contract here. The applicant had been supplied by measure by the Central Middlesex Company; but there was no contract binding his clients to sell by measure. The only obligation was that contained in the Order in regard to the Alperton and Sudbury district, which was binding on the Central Middlesex Company when they took it over. Turning to the 7th and 8th sections, the enactments made it perfectly clear that, after the transfer, the provisions of the Colne Valley Water Company's own Acts were those to which persons were to look. There was nothing in these provisions or the material clauses to in any way introduce the provisions of the Alperton and Sudbury Order relied upon by the other side. The Act of the Colne Valley Company was that of 1873.

Justice WRIGHT: Is there anything in the Order that makes the Company culpable under it?

Mr. FINLAY: I submit there is not.

Mr. CHANNELL: On the other hand, I submit there is.

Justice WRIGHT: There is nothing expressed.

Mr. CHANNELL: Perhaps not. I do not know.

Mr. FINLAY: There is nothing except the Act of 1894.

Mr. CHANNELL: And the transfer of the contract. The contract transfers it, subject to the obligations. I say there is nothing in the 5th section which excludes the obligations incurred.

Mr. FINLAY said if there was any particular section his friend relied upon under the agreement, he should like to know it.

Mr. CHANNELL replied that there were the words "Subject to the obligation."

Mr. FINLAY agreed. The property was still subject to all obligations, including a contract with the London and North-Western Railway Company and other rights and easements. The purchasers indemnified the vendors.

Mr. FINLAY proceeded to call the attention of the Court to the other sections in the Act, when

Justice WRIGHT remarked that, if he understood rightly, the sole argument against him was that the old Order was in force.

Mr. FINLAY said if his friend's argument was worth anything, he must show that the whole of the Alperton Order was still in force.

Justice WRIGHT: Your argument is to the effect that that is perfectly inconsistent.

Mr. FINLAY: I say there is nothing whatever in the Act of 1894 or in the scheduled agreement that can have an effect of this kind. It would be to the fullest extent inconvenient that any one small portion should be dealt with in this way.

Mr. GLEN followed on the same side.

Mr. CHANNELL, in support of the rule, said the whole thing turned upon the Act of 1894. In 1884 there was the Provisional Order, confirmed by Act of Parliament, which provided for the supply of this particular district. It dealt with certain undertakings. The powers were transferred to the Central Middlesex Water Company, who again proposed to transfer them to the Colne Valley Water Company; and the recitals of the Act of 1884 were extremely important. Was it not absolutely clear that the Company taking over the transferred area would be liable to the obligations of the Company transferring? In this case the applicant had been originally served by meter; and the water was supplied to him on certain terms. He paid his rates; and then somebody wanted to buy the undertaking. But they did not tell him to go to Parliament and get this altered. He naturally supposed he would get his water on the same terms when the concern was transferred. When he wanted to protest, the Company would say: "Please read the agreement. It does not alter the provisions." But after the Act of Parliament had been passed, they said they were going to take away the meter, as they had a section in the Colne Valley Act to the effect that they might allow them if they liked, but that they did not like. This was the position. He submitted that the section 5 simply gave additional powers as between the consumer and the two Companies—the one going out and the other coming in. The consumer was intended at any rate to be in the same position as he was before. The point really was this: Was there any indication at all of an intention to take away the existing right which a person had at the time this Act was passed? The Company, he contended, were not excluded from their obligations under the first Act. There was an expressed statutory right; and there was not a word in the Act which indicated the intention to take away the right. The words "subject to the provisions of this Act" must mean that the words of the Colne Valley Act were only to apply where there was nothing additional. The whole intent and scope of the Act was to transfer the undertaking from one body to the other, but to transfer it in its entirety, as far as the district was concerned, and, of course, subject to the obligations. He submitted that the statutory obligation therefore remained, and must be enforced by *mandamus*.

Justice DAY, in giving judgment, said it was perfectly clear that persons resident in the added district had to be supplied with water by the Colne Valley Company under the terms of their Acts. He could not say that the words upon which reliance had been placed on behalf of the applicant in this case justified in the least the contention of section 5, sub-section 2. It seemed to him to raise no difficulty at all, and did not contemplate difficulties with regard to individual domestic supply. It was part of the Company's general obligation to provide works and pipes, and so on; but it did not mean that the words were to be intended to control their dealings with their customers. It carefully provided for rights by saying that the purchasers were to indemnify the vendors, and the liability was controlled by those words. The earlier words of the section did not apply to the service of water for domestic purposes. The rights of persons were made, enacted, and provided for by section 5, sub-section 2. These could not be applied to any other company's Acts or arrangements. The applicant's *mandamus* must be discharged.

Justice WRIGHT was of the same opinion. He agreed entirely in regard to the meaning of section 5 of the Act of 1894; and said he thought no other construction reasonable than that it was the Colne Valley Company's Acts which were to apply. He very much doubted whether this was a proper case for a *mandamus*.

The writ was accordingly discharged. The costs were allowed to stand over till seven days after the Whitsun vacation, in order to give the applicant an opportunity of appealing if thought desirable.

Friday, May 31.

(*Before Mr. Justice* CHITTY.)

Young v. Corporation of Newport.

This was a motion asking that the defendants might be restrained from enforcing, as against the plaintiff, any of the provisions contained in clause 10 of certain general conditions of contract, dated Aug. 16, 1894, made between the parties; and from referring any disputes or differences which may have arisen, or which may arise, touching the construction of the works specified, to the arbitration of Mr. Conyers Kirby, or permitting him to act as Arbitrator, and for the appointment of some fit and proper person to act as Arbitrator.

Mr. BYRNE, Q.C., in supporting the motion, said the plaintiff was a contractor who had agreed with the Corporation for the execution of water-works for the sum of £94,000. The Corporation had a Committee to see how the work was being proceeded with; and, on the 25th of April last, a letter was received by Mr. Young, jun. (who was in control of the works), complaining that the retaining-wall at the west end of the embankment had been constructed of inferior material, and requiring him, in the terms of the contract, to remove the same, and reconstruct it and other portions which were pointed out. He (Mr. Byrne) submitted that this was an unreasonable demand; the wall having been completed, and it being impossible yet to tell whether or not the mortar would answer its purposes. The terms of the contract were then referred to; and it was submitted that, as Mr. Kirby was the Engineer of the Corporation, he was not a proper person to act as Arbitrator.

After considerable discussion, it was arranged that the plaintiff should do what the Engineer required; the defendants agreeing that the question whether any unnecessary expense had been caused should be left to arbitration, and that all proceedings should be stayed—no costs being allowed.

The Assessment of the Dudley Gas-Works.

An appeal of the Dudley Gas Company against an assessment by the Assessment Committee of the Dudley Board of Guardians has been occupying attention at the Worcestershire Quarter Sessions. During the adjourned hearing last Thursday, on the suggestion of the Bench, Counsel consulted, and agreed to a judgment that the assessment should be reduced to £4200 (from £4400), which should not be increased unless there were some substantial increase in the value of the hereditament by the raising and spending of further capital. No order was asked for as to costs.

The Yeadon Rotary System of Gas Making.—At a special meeting of the Leeds Corporation Gas Committee last Thursday, it was decided to accept the offer of the Yeadon Gas-Retort Company, Limited, for an independent test of their apparatus to be made at one of the Corporation gas-works. The plant will be placed under the superintendence of Mr. R. H. Townsley.

The Kidderminster Town Council and the Gas Company.—At the monthly meeting of the Kidderminster Town Council last Thursday, Mr. Purkis moved the appointment of a Committee to inquire into the position of the Corporation in reference to the Gas Company, and to report if it were desirable to purchase the Company's undertaking. He refrained from entering into any discussion on the subject till the Committee had ascertained what the powers of the Council were, and if there was compulsory power to purchase. He had no complaint at all against the Company, which seemed to be ably managed, and had treated the Corporation well. Mr. Bytheway having seconded the motion, Mr. Grosvenor said that, as a Director of the Company, he should not take any part in the discussion or vote on the question; but he might say, on behalf of the Directors, that the Council would receive every courtesy and assistance from them consistent with their duty to the shareholders. The Mayor (Mr. Tomkinson) said that, at the time the local Gas Act was passed, in 1867, the Town Council were extremely liberal, and the Company obtained wide powers. The Corporation had no power to compulsorily purchase; and this being so, the Company could make any terms they chose. Under such circumstances, it would, of course, be most inadvisable for the Council to purchase. There were certain things, however, which might be looked into. The Company, so far as he could make out from the accounts, had a reserve fund of double the amount specified in the Act; and half of it ought to be spent in the reduction of the price of gas. Cooking-stoves and other apparatus had also been purchased out of profits, instead of out of capital. Mr. Grosvenor dissented from these statements. The appointment of the Committee was agreed to.

MISCELLANEOUS NEWS.

COVENTRY CORPORATION GAS UNDERTAKING.

The Annual Report—The Repayment of Capital—Reduction in Price.

As briefly mentioned last week, the annual report of the Gas Committee was submitted at the meeting of the Coventry City Council on the preceding Tuesday. It stated that, after providing £1462, the year's payments into the sinking fund, and making due provision for the renewal of buildings and plant, there was a net surplus profit of £5600, as against £3250 in 1893-4, and £1103 in 1892-3. The increase in the consumption of gas was 5·68 per cent. The extra profit was partly due to this cause, partly to the improvement in the market for residuals, and partly to the fact that in 1893-4 the coal account was swollen by the additional prices paid during the coal strike. It appeared to the Committee that advantage should be taken of the favourable state of the accounts to increase the provision made for the repayment of capital borrowed for the purchase of the undertaking; and they accordingly recommended that £2500 of the profits should be paid into the sinking fund. The balance of £3100—equivalent to 6d. in the pound on the district-rate assessment—would be available in relief of the rate. As to the price of gas, last year it was reduced from 2s. 8d. to 2s. 7d. per 1000 cubic feet within the municipal boundary, and from 3s. 2d. to 3s. 1d. for places outside; and the Committee now proposed that, after June 24 next, the price should be further reduced to 2s. 5d. within the boundary, and to 2s. 11d. outside—the rebates allowed to large consumers remaining the same. The gas made during the year was 355,080,000 cubic feet, which was an increase of 19,093,000 cubic feet. The number of consumers on March 31 last was 5984, as compared with 6069 on the corresponding date last year. The number of stoves on hire was 1409; being an increase of 15. The average illuminating power of the gas during the year was 17·48 candles.

Mr. W. Andrews, the Chairman of the Committee, in moving the adoption of the report, said the net surplus profit of £5600 for the year was the largest amount yet made. The report stated the causes to which this was due; but the main reason why the Committee had been able year after year to reduce the price of gas, and at the same time increase the surplus, was owing to the fact that they had from the beginning steadily pursued the policy of keeping down the capital account in proportion to the amount of gas produced. The first year the Corporation had the gas undertaking under their control, the gas made was 182¼ million cubic feet; and the amount of capital represented by the fixed works, plant, mains, and all properties belonging to the department, was £183,800. It would be seen therefore that in that year, for every million cubic feet produced, the capital for which the Committee had to provide annual interest and sinking fund was rather more than £1000. Coming to the past year, the quantity of gas produced was 335 million cubic feet. But the capital account had only been increased to £197,700 for that portion of the capital representing works and property; so that, for every million cubic feet of gas made, the amount of capital had only been £557, instead of £1000. This was the main reason why the price of gas had been steadily reduced, and the surplus of profit kept up. No doubt this process would go on in the future—at least they might hope so. Regarding the paragraph in the report as to increasing the provision made for the repayment of capital borrowed for the purchase of the undertaking, the Committee recommended that £2500 of the profits should be paid into the sinking fund. The capital borrowed for the purchase of the undertaking was to be repaid within sixty years. The repayment might be made to extend over the whole of that period; but, when the Act was obtained, powers were inserted purposely to enable the money to be paid off in sixty years, or at once if they had the money. The Committee thought it extremely advisable to make some provision for a "rainy day," and not to extend the payment over the whole of the sixty years, but rather to anticipate it. They thought a certain portion of the profits should be paid for that purpose this year. The annual amounts repayable would soon have to be increased, because the money was invested in Consols, the interest on which after a few years would be reduced to 2¼ instead of 2¾ per cent. The Committee, therefore, thought it a safe and sound policy to anticipate that event. If the £2500 were added to the sinking fund, it would enable them, if a bad year's trade or any other cause prevented a surplus being made, to suspend the payment into the fund for a year, and so provide the usual surplus for the ratepayers. The Committee also recommended that the price of gas should be reduced from 2s. 7d. to 2s. 5d. per 1000 cubic feet. Considering the position of the undertaking, they had every confidence, notwithstanding this reduction, that there would be a very handsome surplus next year.

Alderman Maycock seconded the motion.

Alderman Tomson congratulated the Committee on the success of the undertaking—a success which could not have been obtained without good management on their part, great skill and energy on the part of the Manager (Mr. G. Winstanley), and honest and good work on the part of the employees. As Chairman of the Finance Committee, he could not see the necessity for increasing the provision made for the repayment of capital, or, in other words, taxing themselves now for the easement of the burdens of their successors fifty years hence. The sinking fund was arranged so that, in sixty years from the time of borrowing, the capital might be automatically paid off. The amount proposed to be tied up for the benefit of their grandchildren might with advantage be utilized for the present relief of the rates, or spent upon some object for the benefit of this generation. He should propose that the clause of the report relating to this matter be referred back, in the hope that the Gas Committee might see their way clear to amend it in the direction he had indicated.

Mr. James, in seconding the amendment, remarked that the productive capacity of the works had been doubled in ten years; and they bore a favourable comparison with any similar undertaking in the United Kingdom. Therefore he maintained there was no necessity for the increased amount to be added to the sinking fund.

Alderman Marriott approved of the remarks made by the Chairman of the Finance Committee.

Alderman Gulson preferred to vote for the proposition. It seemed to him that the tendency of municipal debt was always to increase; and whenever they had an opportunity of paying off part of the capital without hurting themselves, they ought to do so. The Gas Committee would not always have such prosperous times as these; and it was very likely they would find this debt some time or other a greater burden than they would like or approve of.

Mr. Calcott, though a member of the Gas Committee, supported the amendment; and he believed there were other members who felt with him. They were hardly aware that this large amount of money would be buried for fifty years, until the question had been brought so prominently before them. He believed the Committee were treating the ratepayers very handsomely.

Dr. Fowler supported the report, as there were reasons for thinking the future might not be quite so favourable as the present.

Mr. Goate stated that he had no wish to relieve posterity; and Mr. Lee was of opinion that the profits ought to be devoted at once to the relief of the rates.

Mr. Band, a member of the Gas Committee, said he found they were charging small consumers an amount equal to about 25 per cent. of their gas bills for the hire of meters, whereas in large accounts not more than 1 per cent. was charged as meter-rent. He would not go so far as to abolish meter-rent altogether; but he suggested that it should be relinquished upon accounts under 10s., and a level 2s. 6d. charged in those cases for gas.

Mr. Starley and Mr. Wormell made a few remarks in support of the amendment.

Mr. Andrews, in reply, stated, with regard to Mr. Band's remarks, that the rent of 6d. a quarter which was charged for putting meters and supply-pipes in small houses was only 5 per cent. on the outlay. The larger meters paid more; but, on the average, they did not get above 8 per cent. on the cost of putting in the meters and pipes. The main point which the Council had to consider was that the gas consumers numbered one-half of the householders. There were something like 11,000 houses in Coventry, and about 5500 gas consumers. Were the 5500 householders who were gas consumers to be bled to an unlimited extent for the benefit of the other half? That was the point the Council had to consider. Alderman Tomson was mistaken in supposing this money was to be tied up for fifty years if the report passed. It was nothing of the sort. They could, if necessary, at the discretion of the Committee, give notice at once to those who held securities for loans to pay off £2500. Not only so, but the Council had already sanctioned and given power to the Gas Committee to pay off at once the holders of annuities which would expire in four years. His policy had always been to keep out of debt; and, when in debt, to get out as soon as possible. It was true that the interests of the ratepayers were pledged for the gas undertaking; but they had not been called upon to provide a single penny—it was the gas consumers who had done it. Whatever promises were held out to the ratepayers when the gas undertaking was purchased had been more than fulfilled. He did not know that he need say any more, except that it was no use referring the question back to the Committee. It was not for them to decide the matter. They recommended what he thought was sound policy—that £3100 ought to be sufficient for the ratepayers for one year; and they recommended providing for a rainy day by adding to the sinking fund. The period of sixty years was taken as the utmost possible time within which to repay the capital account—not that it was considered desirable to extend the payments over the whole sixty years, though they had power to do so if they chose. His own opinion was that it would be sound policy to shorten the time if possible now that they had had a very good year.

The amendment referring back the clause in question was carried by 21 votes to 13.

WIGAN CORPORATION GAS SUPPLY.

Annual Report and Accounts.

The annual report of the Gas Engineer of the Wigan Corporation (Mr. Jos. Timmins, Assoc. M. Inst. C.E.) has been received; and, as usual, it is a very complete statement of the position of the undertaking at the close of the year ending March 31. It first deals with the extensions which have been made at the works, and which are of a limited character as compared with previous years. Twenty-eight through retorts have been set in the eastern block of retort-benches; and the erection and fitting of ascension and bridge pipes is being proceeded with. The carbonizing power is thereby increased by 32 tons of coal and cannel per day, representing about 360,000 cubic feet of gas. During the past winter every available retort was put to work for a short period; thus making manifest the necessity for the extension in the carbonizing plant. About one-half of the covering of the old gasholder tank (now No. 3 tar-well) has been paved with stone setts; making a good and ample revivifying-floor for the oxide of iron. The whole of the railway sidings, &c., have been re-laid on a permanent basis; and the haulage of material is thereby much facilitated—Sunday work under this head being practically speaking dispensed with. As to repairs, considerable damage was done to the slating of the retort-house roof during the severe storms that prevailed in the winter. This was, however, quickly made good. In the course of the year, 56 through retorts have been renewed; and other benches requiring attention have been restored to good working condition. The gasholders, condensers, scrubbers, and purifiers have also been carefully scraped and painted. Regarding the distribution department, the following lengths of new mains have been laid: 45 yards of 6-inch; 135 yards of 4-inch; 4872 yards of 3-inch; and 214 yards of 2-inch. There have also been laid 619 new services, and 236 have been repaired or renewed. Broken and otherwise defective mains to the number of 427—the result of subsidences from mining operations and severe frosts—have been repaired. The number of consumers on the books at the close of the year was 7709—an increase of 220, which is much below that of the four preceding years, and under the average of the previous seven years. It is possible, as Mr. Timmins remarks, that the advance in price may have had an influence in this direction. As to the hire of gas-cookers, the number has been augmented by 56—

making a total of 613. As to the working, the quantity of coal and cannel carbonized in the year was 27,030 tons, which was an increase of 1298 tons on the preceding year. The amount of gas made was 311,641,000 cubic feet, being an increase of 15,470,000 cubic feet, or 5·22 per cent.; and the quantity sold was 295,590,000 cubic feet, being an advance of 16,602,000 cubic feet, or 5·95 per cent. The average illuminating power of the gas was 18·52 candles. The quantity of coke made for sale per ton of coal and cannel carbonized is rather less than that of 1893-4. This is owing to the fact that during the stoppage at the collieries, the coke was removed as made; but during last year a large quantity was stored, which, with material of so friable a nature, results in considerable loss. The quantity of sulphate of ammonia produced per ton of coal and cannel carbonized is slightly below that of last year. There was, however, considerably more ammoniacal liquor in stock at the end of the year than at the beginning; and this partly accounts for the small make. During the severe frost, the liquor main to the sulphate-works became dislocated; and there was a break-down in one of the scrubbers—the two combined resulting in a large loss of liquor. The revenue from this product has been seriously affected by the very low prices which have obtained throughout the year. The quantity of tar obtained per ton of coal and cannel carbonized is rather below that of the preceding year; and this is probably owing to the higher temperature at which the process of carbonization has been carried on. The result is, however, satisfactory. The mixture of coal and cannel carbonized has cost 2s. per ton less than in 1893-4. This, however, is not a fair comparison, as very high prices were paid for coal during the stoppage. Regarding financial matters, Mr. Timmins says the wages account per ton of coal and cannel carbonized is rather less than in the preceding year; but the cost of repairs and maintenance is a little in excess—being accounted for by the painting, &c., of gasholders and other apparatus. The cost of repairs, maintenance, and renewal of mains and services is rather in excess of the preceding year—the result of the damage caused by the severe frosts, and, of course, general subsidence from mining operations. There is a considerable advance (£544) under the head of rents, rates, &c., which is due to the increase of the district and poor rates in the borough and out-townships. The cost of the renewal of retorts is below that of the preceding year, and will be still less on the current year. The net profit for the year was £10,453, as compared with £4844 in 1893-4; and the gross profits were £24,205 and £18,412 respectively. The net profit is practically the same as that of 1889-90; but the increased cost of coal and cannel per ton, and the additional rates and capital charges, combined with the abolition of meter-rents, and free fixing of meters, represent the sum of £5700. Against this, there is the increase in the price of gas, amounting for the year to about £2800; and therefore, by comparison, all things being equal, the profit on the past year's working would have been increased by £2900.

Some reference was made to the working by Mr. C. B. Holmes, the Chairman of the Gas Committee, at a recent meeting of the Town Council (*ante*, p. 960), on which occasion he announced that the Committee had unanimously resolved that to all consumers outside the mile radius from the gas-works the price of gas for illuminating purposes only should be reduced by 3d., to 3s. 6d. per 1000 cubic feet; and to those within the borough and the mile radius, it should be decreased by 1d., to 3s. 2d.

SOWERBY BRIDGE GAS-WORKS EXTENSIONS.

Local Government Board Inquiry.

Last Tuesday, Mr. R. Walton held an inquiry at Sowerby Bridge, on behalf of the Local Government Board, relative to an application made by the District Council for sanction to a new scheme of gas-works extension in lieu of a former proposal.

Mr. R. W. EVANS, the Clerk to the Council, in stating the grounds for the application, said that the original scheme, known as the "Holmes," was not actively opposed at the former inquiry; but eventually opposition of a strong character arose. At the District Council election, eight of the candidates who disagreed with the Holmes scheme were returned; seven being at the head of the poll. Only two members of the present Council advocated the old scheme. The Council did not ask for its absolute cancellation; nor did they say it might not be necessary to carry it out in years to come. They maintained, however, that the present works could be so adapted, at a cost of some £6000, as to afford an adequate supply to the district for several years. In addition to paying the heavy rate of 5s. 6d. in the pound, they were about to carry out a sewage scheme at an estimated cost of £20,000; so that the present time was very inopportune for further outlay. They had an existing storage capacity at the gas-works for 395,000 cubic feet of gas; and with the extension proposed, the total capacity would be 637,000 cubic feet. They intended to replace one of the holders, and to increase the capacity of the other.

Mr. *J. L. Wrigley*, the Chairman of the Gas Committee, having given evidence endorsing Mr. Evans's remarks,

Mr. *F. J. Scholefield* said that, though he was at first in favour of the Holmes project, he had changed his views, and was of opinion that the present modified scheme was all that was called for. In reply to a question, he said he was aware that every retort at the works was in use all last winter, and that more were required.

Mr. *W. Wilson*, the Chairman of the District Council, generally agreed with Mr. Evans's opening statement. In his opinion, the great majority of the ratepayers were opposed to spending £20,000 on the Holmes project; and the present scheme would serve all their requirements for at least 15 years to come.

Mr. *J. Marsland*, the Gas Manager, was called, and bore out Mr. Evans's statement. Replying to a question by Mr. Lodge, witness denied that he produced, at a previous Local Government inquiry, plans which were practically those of a Leeds firm, for the purpose of "engineering" the thing through.

Mr. *J. Greenwood*, Mr. *W. H. Baxendale*, and others gave evidence in opposition to the scheme.

The inquiry as to the gas-works then closed.

BUENOS AYRES (NEW) GAS COMPANY, LIMITED.

The Annual Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, 1, East India Avenue, E.C.—Sir WILFORD BRETT, K.C.M.G., in the chair.

The SECRETARY (Mr. E. W. Layton) read the notice convening the meeting; and the report and accounts for 1894, which were referred to last week, were then submitted.

The CHAIRMAN said the report now before the shareholders was the twentieth; and it showed that the profits for the year were £40,436, to which had to be added the balance of £2979 brought forward from 1893—making a total of £43,415. From this had to be deducted the debenture interest, and the amounts received for renewal fund and suspense account, which made together £20,133, and left a balance of £23,282 to be dealt with. The Directors recommended a dividend for the year at the rate of 4 per cent., or 8s. per share, free of income-tax. As the shareholders were aware, 1 per cent., or 2s. per share, had already been distributed; so that there would be 3 per cent., or 6s. per share, to be paid. After paying this, there would be a balance of £3282 to be carried forward. He thought that the general substance of the report might be summarized in the single word "improvement;" and he ventured to submit that they had every reason to be satisfied with the result of the year's working. There had been a very considerable increase in the quantity of gas sold; and the gross profits had been much larger. Cheaper coal, and economies which they had been enabled to effect in the several working departments, had contributed very largely to this. The new oil-gas plant on Young's system commenced operating in December. It had worked very smoothly since; and there was every reason to anticipate that all the hopes the Directors had of it would be eventually realized. The returns for the year showed that there had been a larger quantity of gas sold both for public and private lighting than there had ever been before. Indeed, in this respect it had been a record year; for they had never done such a large business since the establishment of the Company twenty years ago. The public lamps had increased during the year by 1622; making a total of 6889 in use. The number of private lamps had increased by 562—a result which, he thought, the shareholders would consider satisfactory. The quantity of coke, breeze, and tar sold was much the same as in the previous year. The only noticeable fact (which was a curious one) was that, with the mixture of coal now used, the Directors had anticipated that the coke would be of a second-rate or inferior quality; but, so far from this being the case, the public seemed to have "taken on" to it, and had bought it up more satisfactorily than they formerly did the more expensive Silkstone coke. By comparison and analysis, they had found that, owing to the great increase in the sale of gas, the capital in proportion to the business done had been gradually reduced. The Directors expected in the future a greater improvement in this respect; and this, he was sure the shareholders would agree, was a move in the right direction. Their existing plant was quite ample to meet the demand for twice the quantity of gas supplied in 1894. On the expenditure side of the account, they found a very gratifying reduction in all departments. Coal had been cheaper; and purifying materials, manufacturing wages, and salaries had all been less—indeed, all round they had been able to show a satisfactory improvement. They received for residuals nearly 40 per cent. on the cost of the coal, as against 35 per cent. in 1893, which was an appreciable advance. He saw no reason whatever to doubt that they would have continual progress in this respect. Coal would, he hoped, be cheaper; and he was sure the oil plant would come into full operation during the year. Of course, their great difficulty was the premium on gold. The bad debts showed a decrease. They were 14 per cent. less than during the previous year, and 50 per cent. less than in 1892. They had every reason to be satisfied with the working of their officers at Buenos Ayres, who, in every department, had done them good service. Negotiations for the renewal of the public lighting contract were now being carried on with the Municipality. The contract which they had had for twenty years expired on the 1st of May. Of course, the shareholders would easily understand that the Directors looked forward to the renewal of the contract with some anxiety; but he had no reason to believe that they would not be successful in bringing it to a proper conclusion. True the Municipality were more exacting than they used to be; but, on the other hand, the Company had carried on the lighting of the public lamps for many years with, he believed, general satisfaction to the authorities. Therefore, they had no grounds for fancying they would find more difficulty in that respect; but, supposing they could not complete a satisfactory contract, then he would remind the shareholders that the private consumers were the real backbone of the Company, and he was happy to say, so far as the private consumption was concerned, that year after year, and during the past year especially, nothing could be more satisfactory than it had been. The Chairman concluded by moving the adoption of the Directors' report.

Mr. F. J. HESELTINE seconded the motion.

Mr. BUTTERWORTH coincided with the Chairman in the view he took as to the position of the Company at the present time. One thing which struck him more than any other was that the private consumption had increased to a larger extent than that of the public lamps. The public lighting to his mind had been a great loss to the Company—certainly during the depression. He believed the price received in 1891 was not up to the cost of the coal as far as he could make out from the accounts; and in the past year the difference between the receipts for public and private lighting was very heavy. He believed that, if they had the same price for the public as for the private lighting, they could have paid about 2½ per cent. more dividend. This was a very serious matter. He therefore hoped the Directors would be able to make a successful arrangement with the Municipality. He thought it should be on a gold basis, and with a profit. The unaccounted-for gas was a little heavier this year than last; and if it could be brought down 50 per cent., it would represent another 1 per cent. dividend. He believed the leakage was about 15½ per cent. With reference to Young's oil-gas process, he was glad to see the Directors had introduced it; and he hoped it would result in a saving of

cannel, the percentage of which, for many years, had been very heavy. He did not know that the Company would reap much benefit by having the monopoly of that process in the Argentine Republic, as there were several other systems in the market.

The CHAIRMAN said the question of their unaccounted-for gas was receiving the serious attention of the Directors. Gangs of men had been appointed to search for leakages; and, on discovering them, they at once dealt with them. The proportion of leakage would, he hoped, be largely reduced.

The motion was unanimously carried.

The dividend recommended having been declared,

The retiring Directors (Messrs. Ross Pinsent and J. C. im Thurn) and the Auditors were re-elected.

Mr. BUTTERWORTH here inquired whether it would not be advisable to arrange with the other local Gas Companies, in order to get the question of districting discussed.

The CHAIRMAN replied that the matter was under consideration.

A vote of thanks to the Chairman and Directors and the staff at home and abroad concluded the proceedings.

MONTE VIDEO GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Friday, at Winchester House, Old Broad Street, E.C.—Mr. A. K. MACKINNON in the chair.

The SECRETARY (Mr. A. G. Hounsham) read the notice convening the meeting; and the Directors' report and the statement of accounts for 1894, to which allusion was made in the JOURNAL last week, were presented.

The CHAIRMAN said it was a great pleasure to the Directors to be enabled—in spite of the depressed state of the country in which they carried on their operations, and the consequent economy practised by the consumers—to again propose a dividend of 5 per cent. for the year. He was glad to note, during his late visit to Monte Video, that there was a marked change for the better—that the country generally was daily improving in prosperity. As he observed on a former occasion, their product was a luxury for the well-to-do class; and it must continue so, for the works were at a distance from this country of upwards of 6000 miles—labour being necessarily expensive, and the price of raw material and freight fluctuating factors. On this side, the conditions were totally distinct. Coal and labour were at so low a price as to permit of the sale of gas at a correspondingly cheap rate. The arguments that applied in this country as to reductions of the charge for gas could not be made to apply to foreign companies—especially in South America, where the price made gas almost prohibitive to the poorer classes; for labour cost more than double what it did here, and the price of coal was four to five times higher. The well-to-do class was by no means a large body in Monte Video. Hence any depression in the country showed itself acutely in rigid economy; and therefore it was not extraordinary that they had felt its effect so severely in the past few years. Regarding the reduction of 20 per cent. in the price of gas in 1887, the first result was a considerable increase in the consumption; but as bad times came on, a decreased consumption followed. This reduction represented a large sum saved to the consumers. From 1887 to the end of 1894, the saving was £125,675, or $590,673 73c.; and the reduction of the meter-rents to one-half had saved the consumers in the same period £15,992, or $75,164 86c. These two heavy items gave a total of $665,838 59c., which was equal to £141,667. In 1887, they introduced into Monte Video the Welsbach incandescent mantle, which was a plant of slow growth; but it had since rapidly developed. This had also brought about a great saving to consumers. Although it reduced the consumption of gas, it had had a good effect among the consumers; and so it was not surprising that they had had during the year a further increase of 188 new customers. He thought that, bearing these things in mind, they must now wait, and advance in prosperity, until they reached a point that would justify them in making further sacrifices. As the accounts showed, they were fairly prosperous. They had placed £2000 to the reserve fund, which now stood at £74,000; and £500 to the insurance fund, raising it to £12,500, as they were enabled to do in 1893, when they carried forward a balance of £6471, as against £5133 in the present accounts. After paying the 5 per cent. dividend, they had a balance from the year's profits of £1162 to be added to the undivided profits. The surplus in 1893 was £501; so that the difference between the two was £661, representing the additional profit of 1894 over 1893. It must also be borne in mind that they had written off a larger amount for depreciation in the present accounts. The works and plant were in a most satisfactory condition in every respect, and quite equal to manufacturing a much larger output of gas. He concluded by moving the adoption of the report and accounts.

Mr. T. C. TATHAM seconded the motion.

Mr. YOUNG said that, in looking through the report, he had a feeling of disappointment; and he thought the Chairman's speech pointed to the fact that the Company were not really paying 5 per cent. Adding together the reserve fund of £74,000, the insurance fund of £12,500, and the contingency fund of £28,900, they had a total of £115,400. They had a capital of £600,000; and a very large part of the £115,400 was earning interest. Yet they were told that they were to take only 5 per cent. It used to be the practice of the Board to pay the dividend without deduction of income-tax; but during the last few years, the shareholders had not benefited from this. With all the money they had in the funds mentioned, they ought to have a little more return than the 4 or 4½ per cent. which they received; and he should move that the dividend be at the rate of 5½ per cent. He also expressed the opinion that two new Directors should now be placed on the Board.

Mr. EDWARDS seconded the amendment.

Mr. HOOD asked the Chairman the amount of unaccounted-for gas; and what was the value of the residuals as compared with the cost of the coal? Also whether the Board had adopted Young's oil-gas process, or contemplated doing so? With regard to Mr. Young's remarks, he said the dividend certainly paid them 5 per cent. on the par value of the shares, to say nothing of the value at which they had been purchased.

The CHAIRMAN, in reply, said he felt that the Company's position in the future was likely to be very much improved, when the Directors hoped that they would be able to pay more than 5 per cent. As he had already stated, they had a sum of £1162 over and above what they required for the dividend proposed; and, taking all matters into consideration, he thought they had done fairly well. He confessed that he was not himself satisfied in going on year after year, and not paying more than 5 per cent. The consumers were charged, if anything, too much for gas. Therefore the shareholders would understand that the Directors were in a difficult position; and it was advisable to conciliate the consumers by giving them as good gas as they could make, at as cheap a rate as possible. With regard to accumulating the reserve and other funds, the Directors believed that, as prudent men, they were doing a wise thing in securing the prosperity of the Company. Reference had been made to the shares being at a discount; but he might say they had risen 2½ per cent. since last year. He preferred seeing a company's shares rise gradually to rising rapidly. With regard to the constitution of the Board, he pointed out that two of the members had had practical experience in gas making. As to the unaccounted-for gas, the climate being warm, it was rather high—viz., 12½ per cent. They were, however, replacing many of the mains by new ones of larger diameter; and they found the leakage was being reduced every year. Concerning the residuals, until lately they had a very large stock of coke. But a great impetus had been given to building; and the stock had been reduced to a small amount. They obtained a good price for coke; and they also sold more tar than formerly. They had been employing the tar in the manufacture of gas with great advantage; so that what was previously thrown into the sea as a waste product was now all utilized, and it enabled them to economize in the matter of coke. They had also employed oil with very great success.

The motion was adopted.

The CHAIRMAN having moved, and Mr. SIMPSON ROSTRON having seconded, the payment of the dividend recommended,

The SOLICITOR ruled that Mr. Young's amendment was out of order, as, by the Articles of Association, a higher dividend than that recommended by the Directors could not be proposed.

Mr. TATHAM said that, before the motion was put, he wished to call attention to a few figures. They had made a profit of £31,114; and the dividend would take £27,096. In the profit and loss account, they had taken £1038 for bad and doubtful debts, which was a proper amount. As to their capital, if the Company were now starting, it would not be anything like the sum at which it stood. The Company was formed years ago; and they were now heavily capitalized. But the Directors, as careful men, were depreciating the capital year after year; and would anyone tell them that it was not a proper thing to write off £1850? He was sure it was a reasonable thing to do. The result was that, after they had done all these things, they carried to undivided profits a sum of £1162, which was not an exorbitant amount in a business such as theirs.

The motion was carried.

The retiring Directors (Messrs. A. K. Mackinnon and R. Morton) and the Auditors were re-elected.

A vote of thanks was accorded to the Chairman and Directors and the officials and staff.

ELECTRIC LIGHTING NOTES.

In the "Electric Lighting Memoranda" last week, reference was made to an important report by Professor Kennedy upon the proposed purchase of the Electric Lighting Companies by the Newcastle Corporation. The weighty arguments advanced by the Professor in opposition to the purchase have convinced the Electric Lighting Committee that they cannot advise the Council to proceed with the proposal. It is understood, however, that they have not abandoned the idea of a corporate electric supply for public lighting purposes; and the Town Clerk has been instructed to make inquiries into the matter. The Corporation pay the Gas Company something like £14,000 per annum for lighting; and this in itself, it is contended, would furnish a large return for money expended to begin with.

An inquiry has been held at Bristol by Mr. F. E. H. Tulloch, concerning an application for the permission of the Local Government Board to borrow an additional £10,000 for electric lighting purposes. It is proposed to spend the money in extending the area of private supply.

The Corporation of Kingston-on-Thames have lately had before them the first annual report of their Electrical Engineer (Mr. J. E. Edgcome, Assoc.M.Inst.M.E.) on the working of the electric lighting undertaking; the document having been mentioned at the meeting of the Town Council on the 21st ult. We comment, in our "Electric Lighting Memoranda" to-day upon the promises and performances of this enterprise; and it is only necessary to give here a few particulars from the report, which, in addition to the statistics of working, contains a good description of the plant. The station has been running from Oct. 16, 1893; and consequently the accounts cover a period of 14 months. The receipts amounted to £1986 (£1116 being from private consumers and £828 for lighting 36 arc lamps at £20 each); and the expenditure was £3284—leaving a deficit of £1298. The total works' cost per unit of electricity was 4·150d.; brought up by the addition of management expenses to 4·754d. The total, including everything, was 6·146d. The number of units supplied during the 14 months was: To private consumers, 44,642; to public arc lamps, 83,625. The charge to private consumers is 6d. per unit; for the arc lamps, about 2½d. per unit. The report states that "the amount receivable for the sale of current for the first quarter of 1895 (ending March 31) is £469 18s. 10d.; and that this is more than double the amount for the corresponding quarter of 1894. This is regarded "as a very promising outlook for this year's returns." A good portion of the report is devoted to the explanation of the cause of the difference

between the total cost of production (6·146d.) and the average total price obtained (3·638d.) per unit. It is stated to be mainly due to the heavy proportion which the number of units supplied for public lighting bears to the number of units supplied to private consumers, combined with the fact that, though the price charged for current to the latter is 6d. per unit, the public arc lamps are supplied at the rate of 2½d. per unit. As to the outlook, the report states: "The returns of the first year's working show conclusively that the whole question of profit-earning in an undertaking of this kind is merely one of sufficient demand. It must be obvious to the ratepayers that the desired result of converting what is at present a burden upon the rates into a profit-earning undertaking for the benefit of the borough, lies entirely in their own hands; and that such a result will be obtained when the demand for current has sufficiently increased. It must therefore be to the interest of every ratepayer to endeavour to bring about this desired result." The report does not contain any capital account; but we assume that all the original loan has been spent, as the Corporation have had to seek the assistance of the Local Government Board in getting more money. The Board have evidently not been greatly impressed with the methods of the Corporation, for they have only granted £7772 for 15 years; and a deputation has been appointed to wait upon them, and urge that the full amount they have applied for (£10,000) be authorized for 25 years. The Lighting Committee are exerting themselves to "push" electricity; and they have in view a scheme for supplying current to electric launches by the river side. This will increase the revenue. They are also endeavouring to capture certain places of worship in the borough by, offering to supply current at 4·5d. per unit, without discount. This, if agreed to, will take up a proportion of the unused current when shops are closed. When the report came before the Council, the Chairman of the Lighting Committee (Mr. Collings) called special attention to two points. The first was that, if they had charged the same price per unit for current supplied for public lighting as they received from private consumers, the adverse balance would only have been £76. The second was that the receipts for the quarter ending March last were more than double those for the corresponding quarter the previous year. He said that, if this rate of increase continued, instead of having an adverse balance, the Committee would be able to spend £500 or £600 more on coals and wages, and would then come out with a balance in hand. He thought they could congratulate themselves on the success that had attended the works, for which great credit was due to their Engineer. These remarks were applauded; and the report was adopted.

Animation characterized the proceedings at the annual meeting of the Hastings and St. Leonards Electric Light Company on the 23rd ult. The Directors reported that the amount earned during the financial year had been £6641, as compared with £5390 in the previous year. Owing to the change from the high to the low tension system, considerable outlay had to be incurred in the alteration of consumers' fittings, &c., which had been charged to revenue. The Directors considered the Company to be in a sound financial position; but they were unable to pay a dividend. In moving the adoption of the report, the Chairman (Mr. F. A. Langham) put as good a face as possible on the Company's position. He said they were doing more work and supplying more lights; but, on the other hand, the expenses had very largely increased, and the Directors had had considerable trouble during the year with reference thereto. They were engaged in an effort to reduce them in every possible way; and it seemed to him that the future success of the Company must depend very largely upon their being able to cut them down. They found that the installation work was not a prosperous branch of their business; and therefore they had determined to abandon it, and confine themselves to the supply of light, and at as low a price as possible, so as to induce people to use it. Dr. Allen called attention to the fact that in 1894 they sold, including meter hire, £1390 worth more light than in 1893. As a result of this, they had a net dividend of £505 less. That meant to say, £1800 had somehow gone. How had it gone? The expenses of manufacture had increased by £726, and they set aside £383 for depreciation; making £1109 in round numbers. Deducting that from £1390, they still had £280 to the good. Therefore their net balance ought to be about £1300 instead of £622. Then with regard to installations, in 1893 they brought in £1693; and material and labour cost £858—leaving £835. In 1894, they received £1563 for installations; but they cost £1504. On almost the same amount of work, they made in one year more than £700 profit, and next year they had £60. They wished to have this explained. It seemed to him that there had been want of supervision somewhere. How had all this money gone? The Chairman, in the course of his reply, explained that the £1504 referred to included expenses, which would not occur again, in connection with the alteration of the system. The report was adopted.

Last Wednesday, the Special Electricity Committee (King's Road Station) of the St. Pancras Vestry recommended that the former sanction of the Vestry to borrow £65,000 more from the London County Council be rescinded. It appeared that the Committee required £10,000 in excess of this amount; so Mr. Lamble moved that the Committee be empowered instead to apply to the Council for a loan of £75,000 for 42 years. This was carried. Mr. Clements then made a startling statement about the finances of the Vestry. They owed, he said, something like £800,000, and this amount would soon reach a million. He moved that all loans now or hereafter authorized by the Vestry be referred to the Finance Committee, with the ultimate purpose of making a public issue at 3 per cent. This, too, was carried. But while the ratepayers tacitly agree to the raising of these enormous sums for electric lighting purposes, with but an occasional protest from impotent Ratepayers' Associations, so long will the indebtedness of the parish gradually increase, until Mr. Clements's estimate of a million will seem a moderate one. The question is: Is any municipality justified in heaping up debts of such dimensions, and for such purposes, on the guarantee of future proceeds from the rates, which have risen 8d. in the pound during ten years?

Reduction in Price.—The Gas Committee of the Burnley Corporation have decided to recommend the Council to reduce the price of gas from 3s. to 2s. 9d. per 1000 cubic feet, with a discount, as before, of 10 per cent., making it 2s. 6d. net.

THE PROPOSED WATER TRUST FOR WEST KENT.

We learn from a correspondent that all the Local Authorities in West Kent have provisionally agreed to support the scheme for creating a Water Trust, as an opposition scheme to the one put forward for the acquisition by the London County Council of the Kent Water Company's undertaking. The various authorities are all perfectly agreed as to the principle of the proposal to create a Trust; but as might be expected, there is some difference of opinion as to details, none of which, however, are of much importance, and all of such a minor character that a short conference between the representatives of the various bodies would suffice to bring them into accord. Some interest has been aroused by a letter from Sir John Lubbock, in the course of which he makes the following proposition: "To protect the interests of the public, and to obtain adequate control, three Directors should be nominated on the Board of each Water Company—one by the Government, one by the London County Council, and one to represent the interests of Kent. By this plan," he says, "the shareholders in the Companies would escape litigation and gain security. On the other hand, the public would obtain all that can be acquired by purchase, and would avoid gigantic risk. There is, moreover, another consideration which deeply affects us in Kent. We have an ample supply of water for our own population; but if we allow the water under our chalk hills to be taken for the supply of London, we shall be pumped dry, and may not have enough water for our own wants." Our correspondent says that Sir John Lubbock's scheme does not commend itself to the Local Authorities concerned; it being the general opinion in Bromley, Bexley, Dartford, and Erith that, if the existing arrangement is to be disturbed, it is by far the best policy to acquire direct control over the water undertaking than to enter into such a triangular method of management as is proposed. Indeed, the adjustment of working details to satisfy the London County Council on the one hand and the Kent authorities on the other, would almost be impossible, for the requirements of the Metropolis. The objects of many Local Acts of Parliament all more or less containing clauses which have reference to water supply, are so widely different from the requirements and necessities of West Kent generally, where most of the parishes are still managed, on the old parochial plan, by the Rural District Councils, that it would be found that what would be suitable and profitable to London, would be voted as being quite otherwise for the rural parishes; and consequently the exact and precise degree of benefit which each should receive would be a constant subject of contention. At any rate, these appear to be the chief objections entertained by the people in West Kent to Sir John Lubbock's scheme; and it is certain that at present there is a preponderating feeling in favour of the Joint Water Trust.

PLYMOUTH CORPORATION WATER SUPPLY.

Progress of the New Reservoir.

The Western Counties Division of the Incorporated Association of Municipal and County Engineers recently held a meeting at Plymouth, at which Mr. E. SANDEMAN, the Corporation Water Engineer, read a paper on "The Water Supply of Plymouth."

After a brief reference to the history of the undertaking since the first Act giving powers for the construction of water-works was passed in the year 1585, he said the area within which Plymouth had the right to supply water comprised 59 square miles, of which the area of the borough itself was but 2·2 square miles. The gathering-ground draining to the Head Weir intake on the River Meavy was 4885 acres, or 7⅝ square miles in extent, and was situated on the western slopes of Dartmoor. The total yield on the basis of three dry years would be equivalent to 12 million gallons per day; and as the daily consumption was only 4 million gallons, there would be no necessity to look for an additional supply for some time. Owing to the fact that the water was taken direct from the river, and was delivered to the consumers without filtration, and without being improved by being stored in large reservoirs, the deposit in the distributing-pipes was very great. Many of them when taken up for renewal were quite full; and it was difficult to understand how water passed through them in sufficient quantity. Referring to the works now in progress for improving the supply, the author described the construction of the pipe-line from Burrator to the service reservoir at Roborough, which cost £23,000; and he remarked that this main had been in use for twelve months, and had not shown a flaw of any kind. The storage reservoir which was being made at Burrator would cover, when completed, an area of 116 acres. Its length would be 1·1 miles; its greatest breadth, 0·5 mile. The Burrator dam would be 120 yards long, and 77 feet high to the top waterline; and the Sheepstor dam, 160 yards long and 17 feet high. The excavations for both dams were now at an interesting stage. From the site of the Burrator dam, about 23,000 cubic yards of material had been excavated; and the granite rock laid bare gave promise of an excellent foundation for a masonry dam. There were many irregular joints in the surface rock; but the bed rock had a solid appearance. The principal difficulties in this trench were the vertical seams of soft material, which appeared to have been originally open joints in the rock. The largest of the seams had been followed down for some distance, and it gradually narrowed to very small dimensions. The others have become water-tight. The depth of this trench below the bed of the river was 17 feet. The widest part of the excavation measured about 80 feet. At the level of the river, the thickness of this masonry dam would be 62 feet. A roadway 18 feet wide would be carried over the top of the dam on five arches, each with a span of 25 feet. The overflow from the reservoir would go through the arches, and fall down the face of the dam. The Sheepstor trench was of a very different character. It was 10 feet in width at the top, and had now been carried down to a depth of 75 feet in the centre. The whole of the trench was decomposed granite. The most interesting features of this trench were the vertical veins of loose rock. In appearance, they were almost exactly like a rubble wall built without mortar. Most of them carried water. The quantity of water daily pumped from the trench was 250,000 gallons. It was solely on account of these veins that the

trench had been sunk to such a depth, as it would be unwise to fill it in while water was still coming upwards from them.

In the course of a brief discussion, Mr. Sandeman was asked how it was proposed to deal with the fissures in the site of the Sheepstor dam; and he explained that it was intended to follow them down until a point was reached at which no water came through. As they went deeper, the fissures gradually became smaller. One was already tight, another nearly so; and it was only a matter of following them down until they became tight, and then fill them in with concrete.

The members of the Association subsequently visited the water-works, and inspected the work in progress.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Without saying it in a spirit of frivolity, I venture the opinion that what I am about to state will form as interesting a subject for the consideration of the members of The Gas Institute at their meeting in Edinburgh a fortnight hence, as will any of the items upon the programme which has been issued. The great chimney-stalk at the Edinburgh works is giving way at the east side of the foundation, and is already 5 feet off the plumb. The chimney is stated in Beale's text-book to be the highest chimney in connection with any gas-works in the world. It is 392 feet in height. The reason for the great height is that the gas-works are situated in a hollow, upon the northern slope of which is a terrace of some of the finest residences in the city; and in the old days, before the working up of residuals was thought of, and as much as possible of them were consumed, the fumes, in certain directions of the wind, were carried to the houses on the height. With the erection of the tall chimney, this defect was removed. Now, when everything is carefully looked after and utilized, there would be very little of the old nuisance; and if the present chimney should require to be taken down or should fall, it might be a question whether it would be necessary to rebuild it to the same great height. The chimney, I may say, has during all its days, been one of the greatest eyesores in the city; and few would regret its disappearance, if the Gas Commissioners could do without it. The subject came up at a meeting of the Gas Commission on Monday, when the Works Committee reported that they had instructed Mr. Mitchell, the Engineer of the Edinburgh works, to have the large chimney at the works put right. Mr. Mitchell stated that he had observed, from the bulging of a stay-rod, that something was wrong with the chimney; and on applying the theodolite to it, he found that it was, as near as he could estimate, 3 ft. 10 in. out of plumb. He had since had the chimney inspected by Mr. C. Dennis, of Bury, who had ascended to the top; and he found, by putting down a copper wire, that it was 5 feet off the plumb. It would have to go another 10 feet before it fell. It was proposed to erect a temporary chimney, 85 feet high, at a probable cost of over £100; and then the large chimney would be put out of use, and a thorough examination of the foundation could be made. Bailie Walcot expressed disappointment that, so soon after taking over the undertaking, the chimney should be found to be worthless, as they recently discovered a roof to be. Mr. Mitchell explained that the last time Mr. Dennis was engaged upon the chimney was about 4½ years ago; and it was quite plumb then. He was satisfied that the stalk of the chimney was all right, because the pedestal was off the plumb. He did not know what had caused the foundation to give way, whether it had been the blasting in connection with the railway works or not; but he knew that when sitting in his own room in the works, the chair beneath him had been shaken by the shots. The chimney was leaning to the east, where there were no houses; and his apprehension was for his own stokers. The Lord Provost suggested that the railway works might have drawn off the water from the subsoil, which would cause the chimney to heel over. It was eventually resolved to have the recommendations made by the Works Committee carried out, so as to make the chimney safe as soon as possible.

At the same meeting, the Works Committee reported that the output of gas the last financial year of the Commission was 1,452,082,000 cubic feet—an increase over the preceding year of 99,855,000 cubic feet. These figures are subject to correction; but they are not far out. The great increase is doubtless largely due to the reduction of 4d. per 1000 cubic feet in the price of gas, which was made last October. The Commissioners have every reason to be pleased with the rapid growth of their business. In 1888-89, their first year, the output was 1104 million cubic feet; so that the output in the last twelve months is 347½ million cubic feet greater than it was then, which is equal to an average annual increase of nearly 58 million cubic feet. The revenue for the year (provisional) was reported to have amounted to £243,617. Last year it was £244,623. Considering the drop in price of 4d. per 1000 feet during the winter half year, the revenue is remarkably good.

The accounts of the Perth Gas Commission for the past year have been issued. They show a revenue amounting to £20,810, and an expenditure of £15,806; being an excess of receipts for the year of £4994. The income derived from gas consumers amounts to £18,125; and the expenditure includes £5963 for coal. The sum at net revenue, with £90 carried from last year, amounts to £5084; and it will be applied as follows: Annuities payable at Martinmas, 1894, to Whitsunday, 1895, £2812 10s.; interest on debt, £681; sinking fund, £1000; contingency and depreciation of works fund, £500; leaving a credit of revenue account, £91. The amount of the Commissioners' floating debt is £14,000, or £1000 less than last year. The general balance account shows assets amounting to £64,146; and of these the gas establishment is put in at the original sum of £45,000, while the extension and improvement of works appear at £10,181. The estimated expenditure for the year 1895-96 is £20,020. To meet this, it is expected there will be realized from consumption of gas and meter rental £17,715. The estimated amount of gas to be made is 96,700,000 cubic feet. The price is proposed to be reduced from 3s. 9d. to 3s. 6d. per 1000 cubic feet. An appendix is given showing the quantity of gas delivered, and the price per 1000 cubic feet, annually since 1893. In the year which closed on the 30th ult., the total amount of gas consumed was 105,385,200 cubic feet, compared with 40,948,500 cubic feet in 1873, when the price stood at 5s. 10d. The price fixed for the ensuing year is the same as that of 1889 and 1891.

Lord Low, in the Bill Chamber of the Court of Session, on Tuesday, disposed of the question which I referred to in my "Notes" a fortnight ago as having arisen between the Falkirk Joint-Stock Gas Company and the Falkirk Gas Commissioners, regarding the payment of the cost of preparing the deed conveying the Company's undertaking to the Corporation. The sum in dispute was £207 3s., one-half of the cost, which the Corporation wished the Company to bear, as is done in mutual transfers of property. The contention of the Company was that the transfer was a compulsory one, under the Lands Clauses Acts, in terms of which the whole cost is borne by the purchaser. Lord Low said that the 81st and 82nd sections of the Lands Clauses Act were incorporated with the Falkirk Gas Act of last year, except in so far as they are expressly varied by the latter, or are inconsistent with its provisions. In the Falkirk Gas Act, the 51st section said: "The Company shall forthwith sell, and the Commissioners shall forthwith, before commencing to supply gas under this Act, purchase the undertaking of the Company; the price to be fixed under the Lands Clauses Act." The Corporation asserted that this clause did not give compulsory powers to purchase, but merely gave effect to an agreement which had been come to for the purchase and sale of the works. He could not go behind the Act, and inquire what passed in Committee on the Bill. He must construe the Act as it was; and he found nothing in it which suggested that the 51st section did any more than give effect to the agreement. In order that the Corporation might be in a position to implement that clause, it was made imperative on the Company to sell their undertaking. The Company being compelled by the Act to sell their undertaking, it was difficult to see any reason which the Legislature had for denying to them the provisions of the Lands Clauses Act in regard to the expenses of the conveyance which was required to carry the compulsory sale into effect. He therefore did not think that the provisions of the 51st section were in any way inconsistent with, or inapplicable to, the compulsory sale and purchase of the Company's undertaking. He found in favour of the Company's contention, and gave them durer for the sum in dispute, and also the expenses of their application to the Court.

The new hydraulic water supply for Glasgow, which has been under construction for the last two years, was opened yesterday. The works occupy a triangular piece of ground, sloping to the High Street; and advantage has been taken of its contour, and the surroundings, to construct a series of castellated buildings. The object is to supply water at a pressure of 1120 lbs. to the square inch, as against 45 to 50 lbs. and, as stated in the Lord Provost's speech at the opening ceremony, a great deal less water will be used. The supply will also be cheaper; a hoist costing £70 for water, whereas high-pressure will cost only £40. The plant consists of four large Lancashire boilers, with economizers, three sets of pumping engines of 200-horse power each, and two accumulators. Each of the pumping-engines will pump 230 gallons of water per minute, against an accumulator pressure of 1120 lbs., and this with a steam pressure of 120 lbs. The accumulators—two in number—have rams 1 ft. 6 in. diameter, with a 23 feet stroke. The cylinders are cast in one length; and the rams are also each of one piece of cast metal turned. The engines work independently, each one delivering into one of the four 7-inch main-pipes. While the pressure on these is supplied from the accumulators, they have been so arranged that, should necessity arise, the pressure on the delivery mains can be supplied from one accumulator. The four main-pipes have been laid throughout the district of supply in such a way that they form two separate circuits—one circuit to the north of Argyle Street and the other to the south. At certain points, there are cross connecting-pipes with valves, which will enable the system to be worked as one or two separate circuits. At the top of the building are water tanks capable of holding 200,000 gallons of water. The whole building is of red sandstone, surmounted by a chimney-stalk 160 feet in height. Lord Provost Bell made some remarks regarding the Glasgow water supply. He said that 40 years ago, Glasgow got an Act to supply the inhabitants with water; and in 1859, Loch Katrine water was introduced. In 1864 the domestic water-rate was 1s. 4d. per pound. It had fallen till now it was only 6d.; and the charge made for trade purposes was now only 4d., against 1s. Besides the Committee and the Commissioners had been able to pay off about £750,000 of sinking fund, and had reduced the rate to an equal amount. They had supplied all charitable and benevolent institutions free; and the same privilege had been given to the Health and Street Committees, and to all the institutions of the Corporation. These were no mean achievements. He hoped the works opened that day would be equally successful. The Corporation supplied water to 900,000 persons, and would be able to do so to an increasing population. Sir William Arrol had well said that it was the best supply enjoyed by any large city in the world. Fifty million gallons were supposed to meet all requirements; but in four years the Corporation would be able to supply 90 million gallons per day. By taking water from Loch Voil, there would be a watershed equal to that at present utilized. There were thus no physical difficulties to interfere with the supply.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 31.

Sulphate of Ammonia.—The market has recovered from the lowest point a week ago; and the tendency seems to be still in an upward direction. The immediate cause of the advance has been the necessity for covering speculative sales, and the consumptive demand induced by the moderate prices accepted. Makers have, however, been in the main firm throughout; showing very little disposition to follow the downward movement. At no time has there been a very large quantity actually offering on their account; and such parcels as have been put on the market by them have been readily picked up. Some business is still being done for forward delivery; but, at the prices reported, it must be for speculators' account, not for account

of makers—the latter having refused all along to commit themselves ahead, except at a considerable premium. The closing quotations are £9 17s. 6d. to £10 f.o.b. at the ports.

Nitrate of Soda is steady; but there is less doing in all positions—the season being practically over, and next season being still rather far off. Spot value of fine quality is 8s. 3d. per cwt.

LONDON, *May* 31.

Tar Products.—Shipments of pitch continue active; and there is a fair demand for it, both for prompt and forward delivery. Anthracene is dull; and "B" qualities are said to be lower in price. But this will only apply to makes outside the Tar Committee, whose price is said to continue firm at 10½d. "A" anthracene is scarce, and not obtainable under the full Committee quotation. Carbolic acid is moving off freely at former rates. Crystals are said to be in better demand, although the price has not shown any improvement latterly. Creosote salts and various classes of naphthalene continue to go steadily into consumption. Prices, however, are miserably low; and the wonder is how the refined qualities can be produced at their selling prices. There is no improvement in benzol; and the other products are dull, and in some instances unsaleable. The values obtaining during the week are: Tar, 18s. to 22s. Pitch, 32s. west-coast ports; 35s. east-coast ports. Benzols, 90's and 50's, 11d. Solvent naphtha, 1s. Toluol, 1s. Crude, 30 per cent. naphtha, 4d. Creosote, liquid, 1½d.; ordinary, 1d.; salts, 20s. Cresylic acid, white, 1s. 2d.; brown, 11d. Carbolic acid, 60's, 1s. 9d. Anthracene, "A," 1s. 1d.; "B," 9½d. to 10½d.

Sulphate of Ammonia is again in better request. A large business is reported to have been done during the week. Commencing with £9 10s., the price has gradually crept up, till to-day it is worth £10, less 3½ per cent., at all United Kingdom ports, with a tendency to further harden. Gas liquor is quoted at 7s. to 8s.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—I do not hear of any further gas-coal contract of importance being settled in this district; but several are pending. With regard to the Belfast Corporation contract, my information last week was perhaps rather premature; but I understand that the matter is practically settled, and that there is very little doubt that a fair proportion of the contract will go into the hands of a large Lancashire colliery on something like the basis of the prices I mentioned in my previous report. There is no further change to note as to the gas-coal prices, which still average about 6s. 6d. per ton for good screened Wigan Arley four-feet, and about 7s. for partially screened Arley, with quotations in isolated cases at a trifle under these figures. With regard to the general coal trade, a depressed tone prevails, especially with the better qualities. There is necessarily but a very small demand for house-fire coals; and pits that are working simply to orders that come in, are not making above two days per week, with three to four days representing the full average generally. In the open market, there is a good deal of low cutting in prices. Quoted rates, however, remain nominally unchanged at 10s. to 10s. 6d. per ton for best Wigan Arley; 8s. to 8s. 6d., for Pemberton four-feet and seconds Arley; and 7s. to 7s. 6d., for common house coals. A moderate inquiry is reported for the lower descriptions of round coal, for iron-making, steam, and general manufacturing requirements; but supplies are more than sufficient to meet the demand, and low prices are taken. Good steam and forge qualities do not average more than 6s. 6d. per ton at the pit mouth. Engine fuel is in fair demand; and with supplies necessarily very limited, there is a hardening tendency in prices, although as yet no actual advance is obtainable. Pit prices for better qualities of engine fuel average 4s. 6d. to 5s. per ton, and for common sorts from 3s. 6d. For shipment, steam and forge coals are in poor demand, with 7s. 6d. to 7s. 9d. per ton about the average figures; but for common house-fire qualities, there has been a fair business doing at about 8s. a ton, delivered at the Garston Docks or the High Level, Liverpool.

Northern Coal Trade.—There is now a fuller demand for coal; and though the holidays will for a few days interfere with the production, they will also allow of an enlargement of the demand after they are over. Best Northumbrian steam coals are steadier in the extent of the trade, but the price is not firmer with the enlarged volume; for some of the pits that have been very short of work appear to have at last taken slightly lower rates to obtain prompt orders. Current quotations vary from about 8s. 9d. to 9s. per ton; but some small discount is now being allowed. Second-class steam may be quoted at about 8s. to 8s. 6d. per ton f.o.b.; and steam smalls, at from 3s. 6d. to 3s. 9d. It is satisfactory to notice that the orders for second-class steam are becoming larger, as this is one of the best tests of the condition of the trade. Manufacturing coals are also plentiful, with little or no alteration in the range of prices. Gas coals are, on the whole, rather lower in price; and the general quotations vary from about 6s. up to about 6s. 6d. per ton. It is known that some contracts for the supply of Tyneside towns have been settled, and that the prices are considerably lower than those of the expiring contracts. At the same time, the belief prevails that the lowest range of prices for gas coals has been about reached, and that in the course of a week or two the large demand that will then naturally set in will tend in some degree to stiffen the range of prices for this class of coal. But it is certain that one or two producers have lost contracts—such as that of Rotterdam—which have been supplied in some degree from Durham for many years. In the coke trade, the shipments are about an average; but the improvement is more due to the enlarged demand for the north-west than to the export trade. Generally, the price for best Durham coke varies from 12s. 6d. to 13s. 6d. per ton f.o.b. Gas coke is in very limited production, and the output is, of course, easier taken up; but there is no alteration in price this week.

Scotch Coal Trade.—The market still continues unsatisfactory. There is a disposition to stack rather than part with coal at the low rates current. At present prices orders are scarce; all the business doing being from hand to mouth. The prices quoted are: Main, 5s. 10d. per ton f.o.b. Glasgow; ell, 6s. 9d. to 7s. 3d.; splint, 6s. 3d. to 6s. 6d.; and steam, 7s. 6d. to 7s. 9d. The shipments for the week amounted to 148,444 tons—a decrease as compared with the preceding week of 20,874 tons, and as compared with the corresponding week of last year of 10,507 tons. For the year to date, the total shipments have been 2,507,561 tons—a decrease as compared with the same period of last year of 386,198 tons.

Exhibitions of Gas Appliances.—Several exhibitions were held during the past week. Messrs. Fletcher, Russell, and Co., Limited, were exhibiting at the Church Institute, Leeds, and at the David Thomas School Room, Bristol. At the former place, they were assisted by Mrs. H. M. Young, whose practical lectures on gas cooking were a great attraction; and at Bristol, Miss Rose Brown demonstrated the usefulness of gas in the kitchen. At Clayton, an exhibition promoted by the local Gas Company was held; the principal exhibitors being Messrs. C. Wilson and Sons, and the lecturer Miss Holroyd. Messrs. John Wright and Co., Limited, and the Davis Gas-Stove Company, Limited, have recently been exhibiting specimens of their gas appliances in the Drill Hall, Basingstoke, accompanied by some instructive cookery lectures by Mrs. C. Marshall. Reference was made in the JOURNAL last week to the exhibition held under the auspices of the Hastings Gas Company in the Public Hall in that town. Miss Hunt was the lecturer; and, in introducing her, the Company's Engineer and Manager (Mr. C. E. Botley, Assoc.M.Inst.C.E.) referred in suitable terms to the economical use of gas for culinary purposes. To give his hearers an idea of the extent of cooking by gas, he stated that there were in Hastings about 1500 gas-stoves, either purchased or hired; and that nearly all the hotels used gas. During the past week, the Davis Gas-Stove Company, Limited, held a very successful exhibition in the Corn Exchange at Stamford; Mrs. Springthorpe's interesting and instructive lectures attracting highly appreciative audiences. Miss Adelaide A. Hunt gave her spirited cooking demonstrations at the Institute, Brimscombe; and Miss Aimée Richards, ably and intelligently explained the advantages of gas-stove cookery at the Victoria Hall, Tring, for the same Company. During the week, Miss S. M. Westlake gave a series of interesting lectures at Lewisham in connection with the advantages of gas-stoves for cooking and other domestic purposes.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 1187.)

Issue.	Share	When ex-Dividend.	Dividend or Dir. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	10 Apl.	10½	Alliance & Dublin 10 p. c.	10	21½–22½	..	4 13 4
100,000	10	,,	7½	Do. 7 p. c.	10	14½–15½	..	4 16 9
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	105–107	..	4 13 4
200,000	5	10 May	6½	Bombay, Limited	5	6¾–7¼	..	4 9 8
40,000	5	,,	6½	Do. New	4	4¾–5¼	..	4 19 2
380,000	Stck.	28 Feb.	11½	Brentford Consolidated	100	245–250	..	4 12 0
180,000	,,	,,	8½	Do. New	100	195–200	..	4 5 0
220,000	Stck.	14 Mar.	11	Brighton & Hove Original	100	220–225	..	4 17 9
888,500	Stck.	28 Feb.	5	Bristol	100	120–123	..	4 1 4
320,000	20	28 Mar.	11¼	British	20	52–53	+½	4 4 10
50,000	10	14 Mar.	11½	Bromley, Ordinary 10 p. c.	10	22–23	+½	5 0 0
51,510	10	,,	8½	Do. 7 p. c.	10	17–18	+½	4 14 5
328,750	10	14 Nov.	4†	Buenos Ayres (New) Limited	10	7¾–8	+¼	5 0 0
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	100–103	..	5 16 7
150,000	20	28 Feb.	8½	Cagliari, Limited	20	26½–27½	..	6 0 0
550,000	Stck.	10 Apl.	13½	Commercial, Old Stock	100	290–295	..	4 11 6
165,000	,,	,,	10½	Do. New do.	100	214–219	..	4 15 10
160,762	,,	13 Dec.	4½	Do. 4½ p. c. Deb. do.	100	138–143	..	3 2 11
800,000	Stck.	13 Dec.	13	Continental Union, Limited.	100	252–257	..	5 1 2
200,000	,,	,,	10	Do. 7 p. c. Pref.	100	205–210	..	4 15 3
535,000	Stck.	28 Feb.	5½	Crystal Palace Ord. 5 p. c. Stk	100	120–125	..	4 4 0
486,090	10	31 Jan.	11	European, Limited	10	24–25	..	4 8 0
354,060	10	,,	11	Do. Partly paid	7½	17–18	..	4 11 9
5,646,590	Stck.	14 Feb.	12	Gaslight & Coke, A, Ordinary	100	273–278	+1	4 6 4
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	105–110	..	3 12 9
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	277–282	..	3 10 10
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130–135	..	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	197–202	..	3 14 3
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	188–193	..	3 12 6
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	275–280	..	3 11 5
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	163–168	..	3 11 5
1,061,150	,,	13 Dec.	4	Do. 4 p. c. Deb. Stk.	100	129–132	..	3 0 7
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	140–145	..	3 2 1
908,000	,,	,,	6	Do. 6 p. c. do.	100	188–192	..	3 2 6
3,800,000	Stck.	10 May	12	Imperial Continental	100	247–252	+4	4 15 3
75,000	5	13 Dec.	6	Malta & Mediterranean, Ltd.	5	5¾–6¼	..	4 16 0
560,000	100	1 Apl.	5	Met. of Melbourne, 5 p.c. Deb.	100	110–112	..	4 9 3
541,920	20	14 Nov.	5	Monte Video, Limited	20	15½–16½	..	6 1 2
150,000	5	24 May	8	Oriental, Limited	5	7–7½	..	5 6 8
60,000	5	28 Mar.	7	Ottoman, Limited	5	4¾–5¼	..	6 13 4
166,870	10	14 Feb.	2	Para, Limited	10	1¾–2¾	..	8 0 0
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	102–106	..	5 13 2
500,000	100	1 Dec.	6	2nd Do.	100	102–107	..	5 12 1
150,000	10	26 Apl.	7	San Paulo, Limited	10	8¾–9¾	..	7 7 4
500,000	Stck.	14 Feb.	15½	South Metropolitan, A Stock	100	350–360	..	4 6 1
1,350,000	,,	,,	12	Do. B do.	100	295–300	..	4 0 0
290,000	,,	,,	13	Do. C do.	100	307–312	..	4 3 4
775,000	,,	16 Jan.	5	Do. 5 p. c. Deb. Stk.	100	168–173	..	2 17 10
60,000	Stck.	28 Feb.	11½	Tottenham & Edm'nton, "A"	100	230–235	..	4 17 10
				WATER COMPANIES.				
746,021	Stck.	28 Dec.	10½	Chelsea, Ordinary	100	277–282	..	3 11 9
1,719,514	Stck.	10 Apl.	8	East London, Ordinary	100	217–222	+2	3 12 1
654,740	,,	28 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	151–156	..	2 17 8
700,000	50	13 Dec.	8½	Grand Junction	50	107–111	..	3 16 7
708,000	Stck.	14 Feb.	12	Kent	100	304–309	..	3 17 8
1,043,800	100	28 Dec.	7½†	Lambeth, 10 p. c. max.	100	233–238	+1	3 3 0
406,200	100		7½	Do. 7½ p. c. max.	100	200–205	..	3 13 2
330,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	136–140	..	2 17 2
500,000	100	14 Feb.	12½	New River, New Shares	100	350–360	..	3 10 9
1,000,000	Stck.	31 Jan.	4	Do. 4 p. c. Deb. Stk.	100	140–143	..	2 15 11
902,300	Stck.	13 Dec.	6	S'thwk & V'xhall, 10 p.c. max.	100	142–147	+1	4 1 7
126,500	100	,,	6	Do. D 7½ p.c. do.	100	138–143	..	4 3 11
1,155,066	Stck.	Dec. 13	10	West Middlesex	100	270–275	..	3 12 9
						*Ex div.		

† Next dividend will be at this rate.

The Water-Works Purchase Question at Gomersal.—At last Wednesday's meeting of the Gomersal District Council, it was reported that the local Water Company had repeated their offer to sell their plant to the Council for the sum of £10,000; and in order to test the feelings of the Council, Mr. Mortimer moved that the offer be accepted, submitting that the undertaking was well worth the money. It was ruled, however, that the motion could not be accepted without notice; and the question was referred to the Water Committee. Later on a deputation of ratepayers waited upon the Council to protest against the suggested purchase, without an independent valuation, on the basis of the original cost.

Armagh in Darkness.—A rather singular incident occurred at Armagh during the evening of last Friday week, while the Queen's birthday celebrations were at their height. About nine o'clock, the town was left in complete darkness. The explanation given of the occurrence is that one of the men employed at the gas-works was instructed to lower the pressure of the gas, as is the usual custom at that hour. In doing so, the man (who is aged) somehow slipped and fell; and the sudden impact given to the apparatus had the effect of turning out the gas altogether. It is understood that the workman referred to had a narrow escape, as if other of the employees had not come to his assistance in good time, he would have been suffocated.

Sales of Shares.—At recent sales by auction, the following prices have been secured: *Portsea Island Gas Company*—£50 "B" shares, £130; £50 "C" shares, £120; and £21 17s. 6d. of 5 per cent. stock, £25. *Havant Gas Company*—£5 fully-paid shares (first issue) £8 to £8 5s.; and £5 fully-paid (new issue) shares, £4 15s. *Clayton, Allerton, and Thornton Gas Company*—Original shares, £16 10s.; and "A" and "B" shares, £14. *Deal Water Company*—"A" £5 shares, £12 12s. 6d.; "B" £10 shares, £17 7s.; "C" shares (£1 4s. paid), £1 12s.; and "D" £10 shares, £12 15s. *Maidstone Water Company*—Original £10 shares, £27 10s.; Ordinary £10 shares, £18; 5 per cent. preference shares, £14 10s. and £14; 4 per cent. ditto, £11 10s.

Water-Works Extension at Halifax.—The Halifax Corporation have constructed a reservoir at Ogden Kirk, a short distance above Ogden reservoir, for the supply of the village of Bradshaw. The cost, with the supplying service, is estimated at £2300. Bradshaw is at a high altitude, hence the need for the new works. The water was turned on by the Mayor of Halifax (Alderman M. Booth) last Wednesday.

The Defects in the New Water-Works for Downpatrick.—Mr. C. Cotton, the Chief Engineering Inspector of the Local Government Board for Ireland, has presented his report upon the inquiry which he held at Downpatrick respecting the manner in which the new water-works have been executed, the cause of the defective quality of the water, and the necessary remedies for the evil. The conclusions he has formed are as follows: (1) As regards the efficiency of the works for the supply of a sufficient quantity of water at all times, he thinks the inhabitants need not be under the slightest apprehension. (2) As to the execution of the works, so far as the health and sanitary requirements are concerned, it would have been better that the bog in the reservoir should have been covered, and that filter-beds should have been provided; but no change has been made in the works to affect the quality, except that the screen at the outlet was not erected. This should not have been omitted. (3) As regards the cause of the defective quality of the water, it is clear that in the reservoir it is due to peaty water from the catchment area, and to the bed of peat or bog under the water area. The quality of the water is further deteriorated in the distribution-pipes by the effect produced by water lying in pipes newly laid, and coated as usual; but the effect is only transient. (4) The necessary remedies are clearly covering the bog in the reservoir and providing filter-beds, both of which had better be undertaken without delay. The question of the depth of the covering it would be better to leave open until the progress of the work enables the Engineer to form a definite opinion on the point. The filter-beds should be constructed of the usual type of sand filters, of sufficient area and depth of filtering material.

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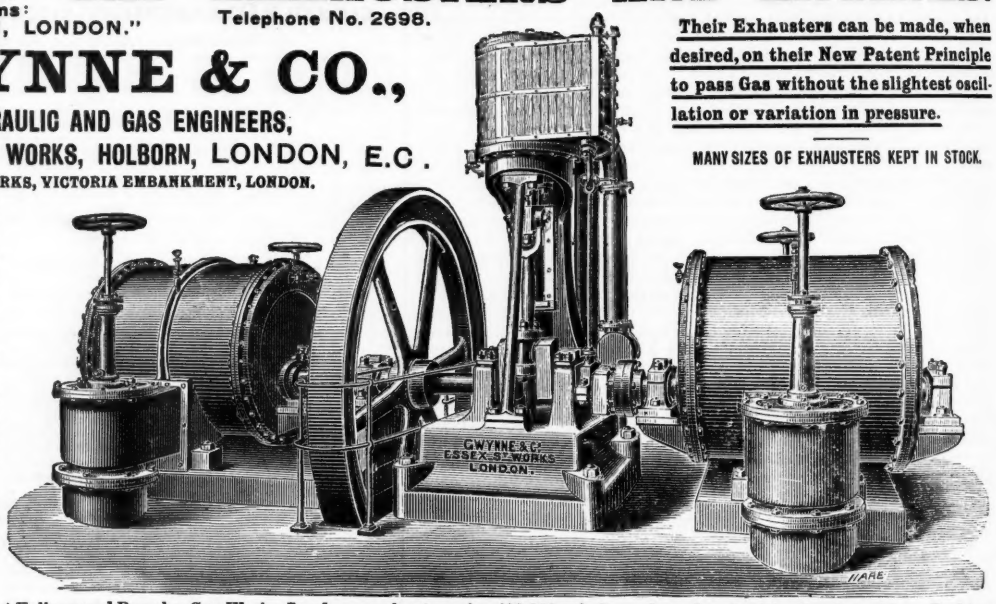

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*** See Advertisement p. II., centre of JOURNAL.

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Manager.
Gas-Works, Dorking.

WANTED, by the Sheffield United Gas- light Company, an efficient ACCOUNTANT to fill the post of Chief Accountant. Must have a thorough knowledge of Bookkeeping by double entry.
Applications, by letter (endorsed "Accountant"), stating Age, Salary required, and previous Engagements, to be made to the General Manager, Mr. Hanbury Thomas, not later than Saturday, June 15.
Commercial Street, Sheffield,
May 24, 1895.

TO CHEMISTS.

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Applications, marked "Chemist," stating Qualifications, Age, Salary required, previous Engagements, &c., to be sent in not later than June 15, addressed to the undersigned.
Testimonials not to be sent till asked for.
HANBURY THOMAS,
General Manager.
Gas Company's Offices,
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GASHOLDER, 80 feet diameter by 24 feet deep, in good condition, FOR SALE; being replaced by larger one.
Full Particulars on application to No. 2519, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A Station Gas-Meter (nearly new) of 7000 Cubic Feet per hour capacity, by J. & J. Braddock. It has only been in use about eighteen months. Also a STATION METER of 10,000 Cubic Feet per hour capacity, by W. Parkinson and Co., London, both in first-class condition.
Can be seen at any time on application, by letter, to No. 2531, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD

GAS INSTITUTE (EDINBURGH) MEETING.

ARRANGEMENTS are being made for SALOON CARRIAGES to be attached to the Train leaving King's Cross for Edinburgh at Ten o'clock next Monday morning, June 10, for the convenience of those attending the above Meeting.
Ordinary Tourist Third-Class Fares will be charged—namely, 50s. for Return Tickets, available for the return journey up to Dec. 31.
Gentlemen wishing to be included in the party, will please communicate, by Friday next at latest, with No. 2536, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C., as intimation must be made to the Railway Company on Saturday as to the number intending to join.

WIRKSWORTH GASLIGHT AND COKE COMPANY, LIMITED.

STATION METER.

THE above Company have for Sale a STATION METER, which is being replaced by a larger one. Capacity 1200 cubic feet per hour. The Meter is in good condition, and may be seen by appointment, or particulars will be forwarded on application to the undersigned.
JAMES LEE,
Secretary and Manager.

TODMORDEN URBAN DISTRICT COUNCIL.

THE Gas Committee of the above Council are prepared to receive TENDERS for the supply of 280 yards of 18-inch GAS-MAINS and SPECIALS.
Specifications and Forms of Tender may be had on application to the undersigned.
Sealed tenders, endorsed "Gas Main," to be sent in not later than Monday, June 10 next, addressed to the Chairman of the Gas Committee, Town Hall, Todmorden.
By order,
GEORGE E. SAVILLE,
Engineer and Manager.
Gas-Works, Todmorden,
May 30, 1895.

BOROUGH OF EVESHAM.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Corporation invite Tenders for the supply of from 500 to 1500 Tons of best screened GAS COAL during the Year ending the 30th of June, 1896, to be delivered on Rail at Evesham.
Tenders to be sent in to me not later than the 21st of June next.
The Corporation do not bind themselves to accept the lowest or any tender.
THOS. COX,
Town Clerk.
Town Clerk's Office, Evesham,
May 29, 1895.

NEW MILLS GAS-WORKS.

THE Gas Committee of the New Mills Urban District Council invite TENDERS for the construction and erection of:—
(1) A GASHOLDER TANK, 65 feet diameter by 20 feet deep.
(2) A GASHOLDER, 61 feet diameter by 20 feet deep, prepared for Telescoping; also GAS WASHER, CENTRE-VALVE, and Two GOVERNORS, and the REMOVING and RE-ERECTING of certain APPARATUS and PIPES at the Gas-Works.
(3) A RETORT-BENCH of Two Settings of Seven Retorts, with all Ironwork complete.
Tenders for each contract to be separate, and endorsed "Contract No. 1," "No. 2," or "No. 3," as the case may be.
Plans and Specifications may be seen on application to the Engineer, Mr. E. Jones, Town Hall, New Mills.
Sealed tenders to be sent to the undersigned not later than Saturday, June 8, 1895.
The Committee do not bind themselves to accept the lowest or any tender.
(Signed) JOSEPH POLLITT,
Clerk to the Council.
Town Hall, New Mills,
May 22, 1895.

NEW MILLS URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL, ETC.

THE New Mills Urban District Council invite TENDERS for the supply of best GAS COAL and CANNEL for the Year ending June 30, 1896.
Estimated quantity 1000 Tons (more or less) of Coal, and 300 Tons (more or less) of best Cannel, to be delivered in such quantities as may be required from time to time at the L. & N.W. or Midland Railway Stations, New Mills.
Form of Tender and full Particulars may be had on application to Mr. E. Jones, the Gas Manager.
Tenders, with Analysis and full Particulars of the Coal and Cannel offered, to be sent in to the undersigned, not later than June 17, 1895, and to be endorsed "Tender for Gas Coal and Cannel."
TENDERS are also invited for the purchase of the surplus TAR and LIQUOR for One Year ending June 30, 1896. Coal carbonized, 1300 Tons.
The Council do not bind themselves to accept any tender.
JOSEPH POLLITT,
Clerk.
Town Hall, New Mills,
May 29, 1895.

FROME GAS COMPANY.

THE Directors of the Frome Gas Company are prepared to receive TENDERS for the supply of from 500 to 4000 Tons of best screened GAS COAL, to be delivered at the Gas-Works Siding between July 1, 1895, and June 30, 1896.

Tenders to be endorsed "Tender for Coal," and delivered to the undersigned on or before the 22nd of June, 1895.

The Directors do not bind themselves to accept the lowest or any tender.

H. F. VINCENT,
Manager.

Frome, May 24, 1895.

LINCOLN CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Gas Committee of the Lincoln Corporation invite TENDERS for the supply of 23,000 Tons of screened GAS COAL and NUTS, to be delivered during a period commencing the 1st of July, 1895, and terminating the 30th of June, 1896.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed and endorsed tenders, addressed to the Chairman of the Gas Committee, must be delivered on or before the 10th of June next.

The Committee do not bind themselves to accept the lowest or any tender.

JNO. CARTER,
Manager.

Gas Offices, Lincoln,
May 22, 1895.

BOROUGH OF HUDDERSFIELD.

GAS COAL.

THE Gas Committee of the Huddersfield Corporation are prepared to receive TENDERS, from Colliery Proprietors only, for the supply and delivery of about 50,000 Tons of best quality unscreened, fresh wrought GAS COAL.

Form of Tender and full Particulars may be obtained on application to Mr. W. R. Herring, Engineer, Gas-Works, Huddersfield.

Sealed tenders, endorsed "Tender for Coal," to be addressed and sent to him, not later than Tuesday, the 18th of June, 1895.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
F. C. LLOYD,
Town Clerk.

Town Hall, Huddersfield,
May 24, 1895.

TENDERS FOR GAS COAL.

THE Directors of the Sunderland Gas Company are prepared to receive TENDERS for GAS COAL (in lots of 5000 Tons and upwards), to be delivered by Rail on the Company's Sidings at Hendon or Ayre's Quay Gas-Works, in such Monthly proportions, from July 1, 1895, to June 30, 1896, as the make of Gas may render necessary.

The Coal to be Clean, Dry, and Fresh Worked.

Tenders, endorsed "Tender for Gas Coal," specifying the description of Coal, the name of the Pit and the particular Seam from which the Coal is to be supplied, to be left at the Offices of the Company, Borough Road, Sunderland, on or before Ten a.m., on Tuesday, June 11.

Short weight or inferior quality to be allowed for.

The Company do not bind themselves to accept the lowest or other tender until after a satisfactory trial of the Coal to which such tender may relate shall have been made.

J. H. COX,
Secretary and Manager.

SMETHWICK GAS-WORKS.

TENDERS FOR GAS COAL, CANNEL, AND LIME.

THE Gas Committee of the Urban District Council of Smethwick invite TENDERS for the supply of about 17,000 Tons of GAS COAL, and 300 Tons of CANNEL for delivery over the Year ending the 30th of June, 1896.

Forms of Tender may be obtained from the undersigned.

TENDERS are also invited for the supply of about 250 to 300 Tons of PURIFYING LIME during the same period.

Sealed tenders, endorsed "Tender for Gas Coal" or "Lime" (as the case may be), and accompanied, if possible, by an Analysis, to be addressed to the Chairman of the Gas Committee, and delivered to the undersigned on or before June 24, 1895.

By order,
W. J. STURGES,
Secretary.

Public Buildings, Smethwick,
May 31, 1895.

COUNTY BOROUGH OF BURY.
(GAS DEPARTMENT.)

THE Corporation are prepared to receive TENDERS for the supply, for One, Two, or Three Years, of

3000 Tons of CANNEL per annum.
30,000 " GAS COAL "
500 " BURGY "
200 " HOUSE COAL "

The same to be delivered in such quantities and at such times as the Gas Engineer of the Corporation may from time to time order.

Printed Forms of Tender and Conditions of Contract may be obtained on application to Mr. W. H. S. Gendall, Engineer, Gas-Works, Bury.

Tenders, which must be on the printed forms, and addressed to the Chairman of the Gas Committee, Town Clerk's Office, Bury, marked "Tender for Gas Coal," to be delivered not later than the 21st of June, 1895.

Preference will be given to those persons or firms who pay to their workpeople the regular standard rate of wages obtaining at the time in the town or district.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bury,
May 31, 1895.

THE INCORPORATED

Gas Institute.

THE THIRTY-SECOND

ANNUAL GENERAL MEETING

OF THE MEMBERS

WILL BE HELD ON

Tuesday, Wednesday, and Thursday,

the 11th, 12th, and 13th of June, 1895,

AT THE

QUEEN STREET HALL,
EDINBURGH.

THE CHAIR WILL BE TAKEN BY THE PRESIDENT,

ROBERT MITCHELL, Esq.

On Friday, there will be a Trip to the Firth of Clyde and Loch Lomond. Full particulars will be announced on the Programme.

THE BENEVOLENT FUND.

The Annual General Meeting of the Donors and Subscribers to the Benevolent Fund will be held on Tuesday, June 11, at 5 o'clock p.m.

FREDK. G. BURFIELD, Secretary.

13, Victoria Street, Westminster, S.W.

BOROUGH OF MACCLESFIELD.
(GAS DEPARTMENT.)

TO ENGINEERS AND IRONFOUNDERS.

TENDERS are invited for the supply and erection of the CAST-IRON GIRDERS, &c., required for covering the River Bollin, at the Gas-Works.

Drawings may be seen, and copy of Specification obtained, on application to the Engineer (Mr. J. G. Newbigging, Assoc.M.Inst.C.E.), at the Gas-Works.

Sealed tenders, endorsed "River Covering," and addressed to the Chairman of the Gas Committee, Town Hall, to be delivered not later than the 8th of June, 1895.

CITY OF MANCHESTER.

TENDERS FOR CAST-IRON PIPES.

THE Gas Committee are prepared to receive, on or before the 13th of June next, TENDERS for the supply of about 3000 Tons of CAST-IRON PIPES of from 3 inches to 36 inches diameter.

Specifications and Forms of Tender may be obtained on application (in writing only) to Mr. Charles Nickson, Superintendent, Gas Department, Town Hall, Manchester.

By order,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
May 24, 1895.

BRIDGNORTH CORPORATION GAS-WORKS.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee are prepared to receive sealed TENDERS for the supply of GAS COAL, including Carriage to the Bridgnorth Railway Station, as follows:—

(1) For One, Two, or Three Years, determinable, at the option of the Gas Committee, at the end of the First or Second Year.

(2) For One Year only.

Evidence as to the quality of the Coal must accompany each tender.

Quantity required: About 2000 tons per annum, in proportionate deliveries as directed—say, 70 per cent. during Winter Months, and 30 per cent. during Summer Months.

The Contract to commence at the end of July.

Sealed and marked tenders must be sent to the undersigned not later than Saturday, the 8th of June.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
J. H. COOKSEY, Town Clerk,
Secretary.

Bridgnorth,
May 25, 1895.

GLOUCESTER GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 23,000 Tons of GAS COAL for One Year from the 1st day of July next, in such monthly quantities as may be required by the Company.

Tenders to state the price delivered at the Midland Railway Wharf, High Orchard, or the Great Western Railway Wharf, Llanthony, Gloucester; or if sent (as preferred) by Water, the price f.o.b., and also the price delivered at the Gas Company's Wharf on the Gloucester and Berkeley Canal.

Further Particulars and Forms of Tender may be obtained of the Company's Engineer, Mr. R. Morland.

Sealed tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, to be addressed to the Chairman, Gas Offices, Eastgate Street, Gloucester, and delivered not later than Monday, the 10th day of June next.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any tender.

By order,
WILLIAM E. VINSON,
Secretary.

Gas Offices, Gloucester,
May 9, 1895.

LONGWOOD GAS COMPANY.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the above Company are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Works during the Year ending June 30, 1896.

Price per ton for Liquor per degree at 5° and 6° Twaddel. The estimated quantity for disposal is about 1000 Tons.

Tenders, sealed and endorsed, to be sent in not later than Tuesday, June 18, 1895, addressed to Edward Armitage, Esq., J.P., Chairman, Longwood Gas Company, Longwood, Huddersfield.

JOHN L. MITTON,
Manager and Secretary.

THE Gas Committee of the Leeds Corporation are prepared to receive TENDERS for the supply of about 20,000 Tons of CANNEL, and about 230,000 Tons of best GAS COALS (Screened or Nuts).

Price per ton to be quoted, delivered at their Gas-Works, Meadow Lane (Hunslet Lane Siding), New Wortley (Gelderd Junction Siding), or at the Gas-Works, York Street, in such quantities as may be required.

The Contract to commence July 1 next, and terminate June 30, 1896.

Forms of Tender may be obtained on application to Mr. R. H. Townsley, General Superintendent Gas Department, Municipal Buildings, Calverley Street.

Tenders may be for any portion of the total quantity required, and will be received not later than Wednesday, the 19th of June next, addressed to the Chairman of the Gas Committee, Municipal Offices, Calverley Street, and endorsed "Tender for Coal."

The lowest or any tender will not necessarily be accepted.

THE Gas Committee of the Leeds Corporation solicit TENDERS for the supply of the following ARTICLES, for Twelve Months ending the 30th of June, 1896:—

	Probable Quantity Required.
Best Merchant Iron, at per ton	about 25 Tons
Do. Sheet do., at per ton	" 5 Tons
Bright Tin Charcoal Iron, at per cwt.	" 10 Cwt.
Wrought-Iron Grate Bars, at per cwt.	" 15 Tons
Steel, at per lb.	" 20 Cwt.
Washers, of various sizes, at per gross	" 250 Gross
Wrought Nails, at per stone	" 100 Stones
Cut do., at per stone	" 50 Stones
Gas Hooks, of various sizes, at per gross	" 150 Gross
Pipe do. " " at per stone	" 50 Stones
Bolts and Nuts, of various sizes	" 5 Tons
Iron Rivets, at per stone	" 160 Stones
Tin 1x, 1xx, xxx, Dxxxx, Doubles at per box	" 40 Boxes
Tin Ingots, at per lb.	" 10 Cwt.
Copper Bar, at per lb.	" 150 Lbs.
Screws of various sizes, for Wood and Iron (discount off price list to be stated)	" 90 Gross
No. 2 Square Ballast Shovels, at per doz.	" 12 Doz.
No. 7 " Coal " at per doz.	" 70 Doz.
Cast Steel Charging Shovels, at per doz.	" 70 Doz.
Coke Forks, at per dozen	" 12 Doz.
Spades, at per dozen	" 3 Doz.
Shovel-Shafts, at per dozen	" 2 Doz.
Pick Shafts, at per dozen	" 30 Doz.
Hammer-Shafts, at per dozen	" 40 Doz.
Picks, at per lb.	" 6 Doz.
Hammer-Heads, of various sizes, at per lb.	" 12 Doz.
Rake-Heads, at per cwt.	" 24 Doz.
Files of various sizes, and Re-cut ing Files (discount off price list to be stated)	" 11 Gross
Trowels, at per dozen	" 20 Doz.
Galvanized Iron Buckets at per dozen.	" 40 Doz.
Weed Brooms, Scavenging, at per doz.	" 50 Doz.
Brushes of various descriptions (net price).	
Besoms, at per dozen	" 60 Doz.
India-rubber Goods (net price).	
Wood Plugs, from ⅜ in. to 24 in.	
Best New Pig Lead, at per ton	" 20 Tons
Sheet Lead, at per ton	" 20 Cwt.
Composition and Lead Tube, at per ton	" 15 Tons
Best White Lead, Walker Parker's No. 1, at per cwt.	" 6 Tons
Best White Lead, Walker Parker's No. 3, at per cwt.	
Best Red Lead, Walker Parker's (best), at per cwt.	" 10 Cwt.
Red Oxide of Iron Paint, in Stiff Paste, per cwt.	" 10 Cwt.
Good, Fine Ground Oil Paints, of various colours, in Stiff Paste, at per cwt.	" 5 Cwt.
Red Oxide Varnish	" 100 Gallons
Oak Varnish	" 40 Gallons
Engine Oil, at per gallon	" 1200 Gallons
Common Oil, at per gallon	" 600 Gallons
Boiled Linseed Oil, at per gallon	" 250 Gallons
Raw Linseed Oil, at per gallon	" 100 Gallons
Neatsfoot Oil, at per gallon	" 50 Gallons
Colza Oil, at per gallon	" 80 Gallons
Turpentine, at per cwt.	" 1 Ton
Best Refined Engine Tallow, at per cwt.	" 60 Cwt.
Locomotive Grease, at per cwt.	" 10 Cwt.
Sponge Cloths, at per gross	" 5 Gross
Cotton Waste (coloured), at per cwt.	" 100 Cwt.
Tarred Gaskin, at per cwt.	" 150 Cwt.
Portland Cement, at per ton	" 20 Tons
Soft Soap	" 30 Firkins
Engine Packing, at per lb.	" 500 Lbs.

TAR.

THE Directors of the Reading Gas Company invite TENDERS for the purchase of their surplus TAR for One Year, commencing on the 1st day of July next.

Specifications for the Contract will be forwarded on application.

Rail communication direct to the Works.

Tenders, endorsed "Tender for Tar," must be delivered not later than Monday, the 10th of June, to

ARTHUR H. CANE,
Secretary.

22, Market Place, Reading,
May 28, 1895.

YORKTOWN AND BLACKWATER GAS AND COKE COMPANY, LIMITED.

TENDERS are invited for the supply of about 800 Tons, more or less, of ALDWARKE MAIN or any other class of really good GAS COAL; to be delivered at the Blackwater Station, S.E.R., carriage paid, between the 1st of July, 1895, and the 1st of July, 1896, in quantities of about 60 Tons, as ordered by the Secretary, giving seven days' notice before expected at the Station.

Terms: Payments Monthly.

Sealed tenders, endorsed "Tender for Coal," and forwarded to the Secretary, will be placed before the Directors at their next Meeting.

Gas-Works, Yorktown,
May 27, 1895.

BOROUGH OF WARRINGTON.
(GAS DEPARTMENT.)

THE Gas Committee of the above Corporation invite TENDERS for the supply of 17,000 Tons of COAL.

Further Particulars and Form of Tender can be obtained on application to Mr. W. S. Haddock, Engineer, Gas-Works.

Sealed tenders, endorsed, and addressed to the Chairman of the Gas Committee, Gas Offices, must be sent in by Ten a.m. on Thursday, June 13 prox.

FREDK. TAYLOR,
Secretary.

Gas Offices, Warrington,
May 27, 1895.

THE Urban District Council of Hindley are prepared to receive TENDERS for the supply of Two LANCASHIRE BOILERS, 20 ft. by 6 ft., and Two ROTARY GAS-EXHAUSTERS, to pass 20,000 Cubic Feet of Gas per hour.

Full Particulars can be obtained on application to Mr. Wm. Dickinson, Gas and Water Manager.

Sealed tenders to be lodged with the undersigned not later than Monday, June 17, 1895.

By order,
STEPHEN HOLT,
Clerk to the Council.

Offices: Cross Street, Hindley,
May 28, 1895.

THE Urban District Council of Hindley are prepared to receive TENDERS for the supply of GAS COAL, CANNEL, ENGINE SLACK, and LIME, required at their Gas-Works during the ensuing Twelve Months; and also for the purchase of the TAR and AMMONIACAL LIQUOR produced at their Gas-Works during the ensuing Twelve Months.

Full Particulars, with Forms of Tender, can be obtained on application to Mr. Wm. Dickinson, Gas and Water Manager.

Sealed tenders, endorsed "Tender for Gas Coal, &c.," to be lodged with the undersigned not later than Monday, June 17, 1895.

By order,
STEPHEN HOLT,
Clerk to the Council.

Offices: Cross Street, Hindley,
May 28, 1895.

COMMERCIAL GAS COMPANY.

TENDERS FOR COAL.

THE Directors are prepared to receive TENDERS for the supply of 190,000 Tons of clean, dry, unscreened, fresh-wrought GAS COALS, delivered f.o.b. to the Company's Steamers at any suitable Port, during the Year ending the 31st of July, 1896.

The deliveries to be in equal monthly quantities throughout the Year.

Payment in cash monthly.

Parties desiring to tender for more than One Year must state separately the price and quantity offered for each Year.

Particulars and Forms of Contract may be obtained from the Engineer, Mr. H. E. Jones.

The Directors do not bind themselves to accept the lowest or any tender.

Tenders, sealed and endorsed "Tender for Coals," to be addressed to the Chairman of the Coal Committee, and delivered at the Company's Offices not later than Twelve o'clock on the 19th of June, 1895.

Commercial Gas-Works, Stepney, E.,
May 30, 1895.

SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gaslight Company invite TENDERS for the supply of about 12,800 Tons of Screened GAS COALS, and about 700 Tons of good English CANNEL, to be delivered free at the Great Western or London and North-Western Goods Yard, Shrewsbury, during One, Two, or Three Years, commencing July 1, 1895.

The Directors reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any tender.

Tenders must be made on Forms (containing further particulars) which may be obtained on application at the Company's Works, or by post, and must be sent to the undersigned, on or before the 22nd day of June, 1895.

By order,
WM. BELTON, Assoc.M.Inst.C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
May 20, 1895.

TENDERS FOR GAS COAL.

THE Directors of the Cheltenham Gaslight and Coke Company are prepared to receive TENDERS for the supply of GAS COAL for Twelve Months from the 1st day of August next.

Full Particulars may be obtained from the undersigned, to whom tenders must be delivered on or before Thursday, the 6th day of June next.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
R. O. PATERSON,
Engineer and Manager.

Gas-Works, Cheltenham,
May 15, 1895.

CAMBRIDGE UNIVERSITY AND TOWN GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of best, well-screened GAS COALS, NUTS, and CANNEL; to be delivered between the 1st of July, 1895, and the 30th of June, 1896.

Forms of Tender and Specifications may be obtained on application to the undersigned.

Sealed tenders, addressed to the Chairman, not later than June 10, endorsed "Tenders for Coal."

The Directors do not bind themselves to accept the lowest or any tender.

By order,
O. J. WEEKS,
Manager.

Gas Office, Cambridge,
June 1, 1895.

COUNTY BOROUGH OF WEST BROMWICH.
(GAS DEPARTMENT.)

TO COLLIERY PROPRIETORS.

THE Gas Committee are prepared to receive TENDERS for the supply of 22,000 Tons of GAS COAL, for use at their Works, Albion, West Bromwich.

The Committee do not bind themselves to accept the lowest or any tender; and they reserve to themselves the right to divide the contract between several firms.

Forms of Tender may be obtained upon application to Mr. Thomas Glover, Manager of the Works.

Sealed tenders, properly endorsed, to be sent to me not later than Tuesday, the 11th of June.

By order,
THOS. HUDSON,
Secretary.

Town Hall, West Bromwich,
May 28, 1895.

CORPORATION OF LEICESTER.

COAL TENDERS.

THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the supply of COALS, COBBLES, or NUTS (about 120,000 Tons per annum), for One, Two, or Three Years ending May 31.

Particulars and Form of Tender can be obtained on application to the Engineer.

Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Gas Coal," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, the 8th of June next.

The Committee do not bind themselves to accept the lowest or any tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.

Gas Offices, Millstone Lane,
Leicester, May 15, 1895.

SCARBOROUGH GAS COMPANY.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Scarborough Gas Company invite TENDERS for the surplus TAR and the whole of the AMMONIACAL LIQUOR to be produced at their Works for One or more Years from the 1st day of July next.

Tenders for Liquor may be submitted either at a fixed price per ton or on a sliding scale, regulated by the price of Sulphate. Preference will, however, be given to the latter.

Further Particulars may be obtained on application to the undersigned, to whom sealed tenders (duly endorsed) must be delivered not later than Noon, on Saturday, the 15th day of June next.

The Directors do not bind themselves to accept the highest or any tender.

By order of the Board,
(Signed) J. HOLLIDAY,
Engineer and Secretary.

Gas Offices: 32, Westborough,
Scarborough, May 17, 1895.

TO COAL MERCHANTS, SHIP OWNERS, AND OTHERS.

THE Directors of the Torquay Gas Company are prepared to receive TENDERS for the supply for One, Two, or Three Years, of about 14,000 Tons per year (or such other quantity as may be agreed on) of best approved GAS COALS.

Tenders to state the price of the Coals, and the freight to Dartmouth or Torquay, separately and together, and also for delivery into the Company's Works, adjoining the Great Western Railway, free of all charges.

Payment by cash for freight on delivery, and by three months' Bills for the Coals.

Further Particulars to be obtained from Mr. Beynon, the Manager of the Company, Hollacombe, Paignton; and tenders to be sent to the undersigned on or before the 8th of June next.

Forms of Tender to be obtained from the Manager on payment of a fee of 10s. 6d., returnable on receipt of a *bond-fide* tender.

JOHN KITSON,
Secretary.

Torquay, May 20, 1895.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate to DEBENTURE STOCKS and BONDS, WILL BE CLOSED at Four o'clock p.m., on Monday, the 10th prox., for the Half Year ending on the 30th prox., and will be RE-OPENED on the morning of Tuesday, the 11th prox.

The Interest for the Half Year will be payable on the 1st of July next, to the Proprietors registered on the closing of the Books.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., May 31, 1895.

By order of the Directors of the Lea Bridge District Gas Company, £4000 4 per cent. PERPETUAL DEBENTURE STOCK of this Company, to be created and issued under the Provisions of the Lea Bridge District Gas Act, 1878, and offering to Trustees and others an Investment of the highest class, for Sale by Auction by

MR. ALFRED RICHARDS, at the Mart, E.C., on Thursday, June 20, at Two o'clock precisely in lots.

Particulars of the SECRETARY of the Company, 3, JEFFREYS SQUARE, E.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

ILFORD GAS COMPANY.

DESIRABLE INVESTMENTS.

By order of the Board of Directors of the Ilford Gaslight and Coke Company, Limited.

MR. ASHMOLE will Sell by Auction, at the Angel Hotel, Ilford, on Thursday, June 6, 1895, at Five for Six o'clock p.m., 800 "B" SHARES of the nominal value of £5 each in the above old established and flourishing Company.

Particulars and Conditions of Sale may be obtained of the SECRETARY of the Company; or of WM. ASHMOLE, F.A.I., Auctioneer, Surveyor, and Estate Agent, ILFORD.

JUNE 20, 1895. THREE O'CLOCK.

IMPORTANT TO CAPITALISTS AND INVESTORS.

AUCTION SALE OF SOUND AND IMPROVING INVESTMENTS, IN UNQUESTIONABLY HIGH-CLASS SECURITIES.

GAS SHARES IN THE GRAVESEND AND MILTON GASLIGHT COMPANY.

MESSRS. ALFRED SPAIN & SON are instructed by the Directors of the above Company to SELL BY AUCTION, at the New Falcon Hotel, West Street, Gravesend, on Thursday, June 20, 1895, at Three o'clock precisely in the afternoon,

TWO HUNDRED AND FIFTY SHARES OF £20 EACH

(ranking equal to all the 7½ per cent. Shares), in the GRAVESEND AND MILTON GASLIGHT COMPANY; being a further portion of the Capital authorized by the Company's Act of Parliament of 1890.

The Company are now offering the above Stock for the purposes of further Extension of their Works, rendered necessary by the large increase in the Consumption of Gas in their District, the development of Gas Cookers and Stoves, and the supply of what is known as the Penny-in-the-Slot Meter, for which the Company have considerable orders.

The Share Certificates will (when fully paid) be delivered to the Purchaser, or his Nominee, Free of all Stamp and Transfer Fees, and £15 per Share, part of the Purchase-Money will not be called up until Sept. 29 next.

Particulars and Conditions are in the course of preparation, and may be had of the Solicitor and Secretary to the Company, CHARLES R. GRAMSHAW, Esq., King Street, GRAVESEND; and from the AUCTIONEERS, at their Estate, Survey, and Valuation Offices, 36, New Road, GRAVESEND; and 11 and 12, GREAT TOWER STREET, E.C.

NOTICE.

TO GAS ENGINEERS AND OTHERS.

MESSRS. CLAPHAM BROS., Limited, Keighley, Yorkshire, are no longer authorized to Manufacture my CONDENSER and WASHER-SCRUBBERS.

The above-named Gas Apparatus are erected and giving entire satisfaction at the following places: Neath, Lincoln, Sheffield, Ellesmere, Mountain Ash, Malden, Cullingworth, Montreal (Canada), Woodstock (South Africa), Cape Town (South Africa), &c.

These Appliances can now be obtained solely of the undersigned.

Winchester House, London, E.C. J. A. KELMAN.

AUSTRALIAN BOGHEAD.

Practical Results in Ordinary Working:—

Gas per Ton . . .	15,100 Cub. Ft.
Illuminating Power .	45·6 Candles.

For Samples and Prices, f.o.b. London or c.i.f. to Continental Ports, apply to

THOMAS RAISON & Co.,
117, LEADENHALL STREET, E.C.

TO EMPLOYERS, COMPANY DIRECTORS, ETC.

The LAW GUARANTEE & TRUST SOCIETY,
LIMITED,
GUARANTEES FIDELITY.

Send for complete Prospectus, containing Balance-Sheet, Copy of Policy, &c., &c.

HEAD OFFICE:
49, CHANCERY LANE, LONDON, W.C.

NOTICE.

The Incandescent Gas-Light Company, Limited, Hereby Give Notice, that they only supply their Mantles subject to the following express Conditions, which are printed and pasted on each box:—

"The Incandescent Gas-Light Company, Limited, in supplying the Mantle contained in this box, grant a Limited License to the purchaser to sell or use the same on the express condition that neither the purchaser nor any other person into whose hands the same may come shall use or sell the said Mantle except in connection, or for use, with Burners sold or supplied by the Company; any other sale or use will amount to infringement of the Company's Patents. The Company supply Mantles for the purpose of renewals at the nominal price of 1s. 3d., subject to the Conditions and Limitations above set forth."

In the case of *The Incandescent Gas-Light Company, Limited v. Cantelo,* **Mr. Justice Wills upheld the Validity of these Conditions and Limited License; and, in the course of his Judgment, said:—**

"The patentee has the sole right of using and selling the articles; and he may prevent anybody from dealing with them at all. Inasmuch as he has the right to prevent people from using them or dealing in them at all, he has the right to do the lesser thing—that is to say, to impose his own conditions. It does not matter how unreasonable or how absurd the conditions are. It does not matter what they are if he says at the time when the purchaser proposes to buy, or the person proposes to take a license: 'Mind I only give you this license on this condition;' and the purchaser is free to leave it or take it as he likes. If he takes it, he must be bound by the condition."

In the case of *The Incandescent Gas-Light Company v. Hirschfeld and Others,* **the Honourable Mr. Justice Romer certified that the Validity of the Plaintiffs' Patents was established. Infringers in future will be liable to costs as between Solicitor and Client.**

(Signed) **FAITHFULL & OWEN,**
Solicitors for the Incandescent Gas-Light Company, Limited.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Bombay Gas Company, San Paulo Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY,
LIMITED,
Newcastle-on-Tyne.
W. H. PARKINSON,
FITTER.

"BEAR CREEK" CANNEL.

LOG MOUNTAIN COAL, COKE, AND TIMBER CO.,
PINEVILLE, KENTUCKY, U.S.A.
Cable Address: "Hull, Pineville."

LONDON AGENTS:
W. J. WILSON & Co., Suffolk House, Cannon St., E.C.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·4 candles.
Coke	68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.
B Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

TAR AND LIQUOR PURCHASED

JOHN CLARKSON MAJOR,
(*Established 1851,*)
Tar Distiller and Manufacturing Chemist,
WOLVERHAMPTON.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS:—

Yield of Gas Per Ton	11,205 Cubic Feet.
Illuminating Power, $16\frac{7}{10}$ Stand. Sperm. Candl.	
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. Per Ton.	
Sulphur	A little over 1 Per Cent.
Ash	Under 1 Per Cent.
Tar	163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.	

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE, 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton	10,500 Cubic Feet.
Illuminating Power	17 Stand. Sperm Candl.
Coke (of excellent quality)	$13\frac{1}{4}$ Cwt. Per Ton.
Sulphur	1·13 Per Cent.
Ash	1·34 Per Cent.
Tar	180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor	$94\frac{1}{2}$ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COALFIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

T. B. KITTEL, SHEFFIELD.

CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL

ENGLISH & SCOTCH CANNELS.

REAL SILKSTONE GAS COAL

ANALYSIS AND PRICES ON APPLICATION.

T. B. KITTEL, SHEFFIELD.

ARMSTRONG'S PATENT CANDLE SAFETY LAMPS.

Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

48, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

LOW MOOR BLACK BED GAS COAL.

YIELD OF GAS PER TON	10,375 CUBIC FEET.
ILLUMINATING POWER	17·50 SPERM CANDLES.
COKE	75 PER CENT.

Prices, f.o.r. or f.o.b., on application to

GEORGE & JOHN HAIGH,
RAVENS LODGE AND CONYERS' COLLIERIES,
DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO.,
Central Plumbing Works, Town Hall Square,
BOLTON.

Practical Makers of all kinds of Saturators, and Specialists in every description of Lead Work required in connection with Sulphate Plants.
Special attention to Repairs.
Improved Lead-Burning Machines, Sulphate Bagging Machines, Copper Scoops, &c.

HIGHEST REFERENCES ON APPLICATION.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET ADELPHI, LONDON, W.C.

VISITORS
TO THE
EDINBURGH
MEETING
OF THE
GAS INSTITUTE
are cordially invited to inspect the most modern
AUTOMATIC COAL AND COKE HANDLING PLANTS,
in all Stages of Progress, at our
ABERDEEN WORKS.

NEW CONVEYOR CO., LTD.,
3 & 4, LIME STREET SQUARE, LONDON, E.C.

KENT'S THICK GAS COAL
RAISED AT
The Wharncliffe Woodmoor Colliery,
BARNSLEY.

Yield of Gas, nearly 12,000 *Cubic Feet per ton of Coal; and Illuminating Power nearly* 17½ *Candles.*

The following is a complete ANALYSIS made by Mr. R. O. PATERSON, C.E., Gas-Works, Cheltenham:—

Specific Gravity (Water 1).	1·276
Weight of One Cubic Foot.	79·700 lbs.

PROXIMATE ANALYSIS.

Moisture in Coal	2·68 per cent.
Volatile Matter.	35·60 ,,
Fixed Carbon	58·80 ,,
Sulphur	0·96 ,,
Ash.	1·96 ,,

COMMERCIAL ANALYSIS.

Gas per Ton of Coal	11,760 cub. feet.
Gas per Cubic Foot of Coal	418 ,,
Illuminating Power	17·44 candles.
Value of One Cubic Foot in Sperm	418 grains.
Value per Ton of Coal in Sperm	703 lbs.
Coke per Ton of Coal	1367 ,,
Coke	61·05 per cent.
Ash in Coke	3·21 ,,
Sulphur Eliminated with Volatile Products per Ton of Coal	9·4 lbs.
Sulphur in Coke per Ton of Coal	12 ,,
Ammoniacal Liquor per Ton of Coal	19·7 galls.
Tar per Ton of Coal	12·2 ,,

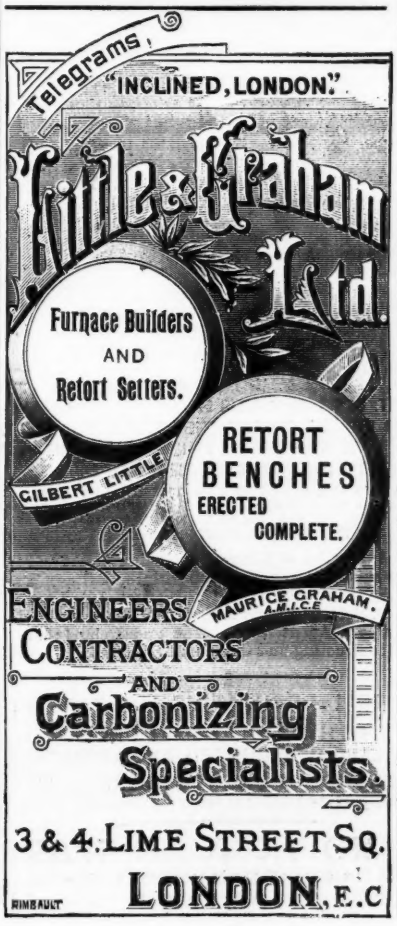
R. O. PATERSON, C.E.
Gas-Works, Cheltenham, 8th August, 1894.

For Price, &c., apply to the
Wharncliffe Woodmoor Colliery Co
LIMITED,
BARNSLEY;
Or to Mr. W. H. HARVEY,
17, Old Queen Street, Westminster, S.W.

HUNTER'S
OXIDE OF IRON.
JAMES HUNTER, MINER, AND SHIPPER OF
NATURAL IRISH BOG ORE.
This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.
Samples and Prices on application.
11, BAY STREET, PORT GLASGOW.
Telegrams: "HUNTER, PORT GLASGOW."
Established 1872.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

PIPES, 2-in. to 8-in. PIPES, 2-in. to 8-in. PIPES.
MONIER-WILLIAMS & Co.
IRONFOUNDERS,
MIDDLESBROUGH.



COKE-BREAKERS,
PRICES REDUCED.
(THOMAS & SOMERVILLE'S PATENT.)
New Design, with two Cutting Rollers, making less Breeze than their old pattern.
GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, E.C.,
And at STROUD, GLOUCESTERSHIRE.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.
FOR PRICES AND PARTICULARS, APPLY TO
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON AND COAL COMPANY, Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

The Analysis made by Messrs. J. and H. T. Pattinson, Public Analysts for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a Working Analysis made of these Coals by the Tudhoe and Sunderland Bridge Gas Company:—

[COPY.]
TUDHOE AND SUNDERLAND BRIDGE GAS COMPANY.
Tudhoe Gas-Works,
Spennymoor,
8th June, 1893.

Messrs. The
WEARDALE IRON & COAL COMPANY, LTD.

GENTLEMEN,
For the last two months we have used your **THORNLEY GAS COAL** exclusively at these gas-works; and I have pleasure in herewith giving you the actual results obtained during the trial.
Yield of Gas per ton: 10,300 cubic feet.
Yield of Coke: 13½ cwt.
Illuminating Power of Gas, average of a series of tests, 17 Sperm Candles.
The Coke was of excellent quality.
The following is a complete ultimate Analysis of the Coal.

	Per Cent.
Carbon	83·128
Hydrogen	5·116
Oxygen	7·401
Nitrogen	0·585
Sulphur	0·620
Ash	3·130
Water	0·020
	100·000

Analysis of the Coke.

Carbon	93·31
Sulphur	0·61
Ash	5·00
Moisture	1·08
	100·00

I am, Gentlemen,
Yours truly,
A. B. COWAN,
Manager.

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY,

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

SELF-SEALING MOUTHPIECES

Made strong for Horizontal and Inclined Retorts in Round, Oval, and D shapes, and to open at Right Angles for Machine Work. Faced in Ruscoe's Patented Machines; thus ensuring correct and smooth joints when closed.

TESTIMONIALS.

Sheffield United Gaslight Company, Commercial Street, Sheffield, 11th April, 1895.

DEAR SIR,—In reply to your enquiry, I have pleasure in saying that we have a number of your Retort Mouthpieces at work, and that they give perfect satisfaction. Yours faithfully,

FLETCHER W. STEVENSON,

Mr. JOHN RUSCOE. Engineer.

Leigh Urban District Council, Gas & Water Departments, Leigh, Lancs., April 11th, 1895.

DEAR SIR,—In reply to yours of yesterday, I have pleasure in testifying that the Retort Mouthpieces which you supplied to the Leigh Gas-Works seven years ago have given every satisfaction. We have now 267 of the Mouthpieces erected, and hitherto none have required refacing. Yours faithfully,

Mr. J. RUSCOE, Albion Works, Hyde. A. T. FLETCHER.

FOR PARTICULARS APPLY TO JOHN RUSCOE, ALBION WORKS, HYDE.

CANNEL AND GAS COALS,

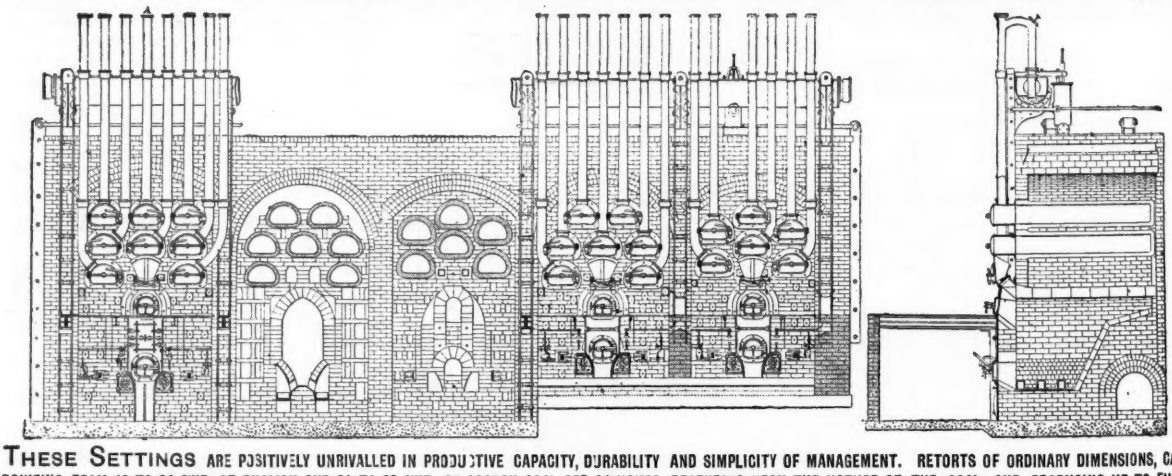
Rich in Illuminating Power and Quantity of Gas and Residuals.

CRAWSHAW AND WARBURTON,

COAL AND CANNEL PROPRIETORS, DEWSBURY, YORKSHIRE.

ANALYSES AND PRICES ON APPLICATION.

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS, CARBONIZING FROM 18 TO 24 CWT. OF ENGLISH AND 21 TO 26 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Full Particulars may be had on application to the Patentee's Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON**, Retort Setter and Contractor, 5, Stuart Street, Shawlands, Glasgow, Agent for Scotland and Ireland; and to the Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non* TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.

The Patentee's SELF-SEALING CAPS FOR THE TOP OF ASCENSION-PIPES, and his "SPECIAL" FLUE PORT BOXES, are most important additions to his Carbonizing Plant.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S Patents, all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.

Further Information and Pamphlets from Principal Agent.

INCANDESCENT GAS-LIGHT

(Welsbach Patents)

The Great Reduction in Prices,

Due to Colossal Sales,

Places this highly popular Light within the means of all classes.

The greatly Reduced Consumption of Gas

COVERS THE INITIAL COST OF THE BURNERS IN FROM SIX TO EIGHT MONTHS.

The PRICES have been REDUCED as follows—

The Ordinary "C" Burner . . . . Price 10s. 6d.

The "C" Bye-Pass Burner . . . . „ 12s. 6d.

Prices of other Patterns reduced proportionately.

SPECIAL ATTENTION IS CALLED TO

THE "S" BYE-PASS BURNER,

Which, with a Consumption of 2¼ Cubic Feet of Gas an hour, gives a light of 25 to 30 Candle Power.

This Pattern is particularly recommended where it is desired to effect a large saving in Gas rather than to effect a great increase in the Light.

The attention of Gas Managers and Gas Engineers is called to this System of Lighting as one which tends to Popularize the use of Gas as an Illuminant, owing to the following Advantages—

ECONOMY IN CONSUMPTION OF GAS, COMBINED WITH HIGH ILLUMINATING EFFICIENCY.

FREEDOM FROM SMOKE, DIRT, AND FLICKERING.

GREATLY REDUCED HEAT.

The *Lancet* Special Analytical and Sanitary Commission, in an exhaustive report, pronounces the Incandescent Gas-Light System to be the Healthiest, Best, and most Economical System of Gas Lighting.

SUITABLE FOR EVERY PURPOSE OF INSIDE OR OUTSIDE LIGHTING.

For further Particulars, apply to

The INCANDESCENT GAS-LIGHT CO., LIMITED,

Palmer Street, Westminster, London, S.W.

JAMES & WILLIAM WOOD, Limited,

GAS COAL AND CANNEL CONTRACTORS AND EXPORTERS,

57, GRACECHURCH ST., LONDON, E.C.

Registered Office—28, ROYAL EXCHANGE SQUARE, GLASGOW.

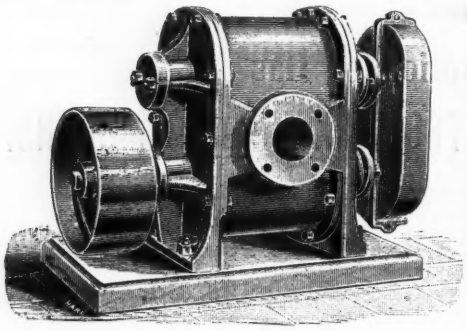
JOHNSON'S PATENT

DRUM PUMP AND GAS EXHAUSTER.

The Pump of the future for quickly and economically moving large bodies of Water, Semi-Fluids, &c.

The force of the Piston Pump with the capacity of the Centrifugal combined.

NO SLIDES OR FRICTIONAL WORKING PARTS.



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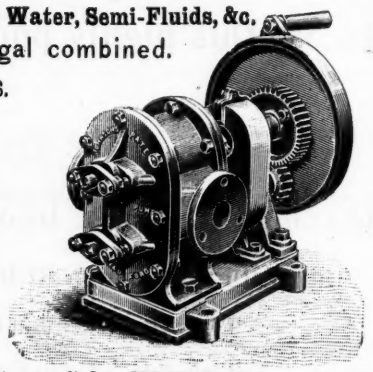
NO VALVES.



As supplied to H.R.H. the Prince of Wales for Pumping Gas Liquor at his Sandringham Gas-Works.

DRUM ENGINEERING COMPANY,

Hydraulic and Pneumatic Engineers, 55, ATHOL ROAD, BRADFORD.

TANKS ROOFS

CUTLERS PATENT TUBULAR GAS CONDENSER SUITABLE FOR GASWORKS OF ALL SIZES, AND FOR ANY CLIMATE OVER 100 ERECTED

MAKERS OF GASHOLDERS OF EVERY SIZE AND TYPE

HUNT'S PATENT WASHER, IS THE ONLY APPARATUS NECESSARY BETWEEN THE CONDENSER & PURIFIERS, IT REQUIRES NO MOTIVE POWER

TELEGRAMS "RETORTUS" LONDON

NATIONAL TELEPHONE 5059.

S. CUTLER & SONS, MILLWALL LONDON

FOREIGN AGENTS COLONIAL AGENTS

AGENTS FOR THE "MAXIM" CARBURETTER, A MOST SUCCESSFUL ENRICHER, BY WHICH THE USE OF CANNEL COAL IS AVOIDED AND ALL TROUBLES WITH NAPHTHALENE OBVIATED

IMPROVED SYSTEM OF CARBURETTED WATER-GAS PLANT PARTICULARS ON APPLICATION.

CUTLER'S FREEZING PREVENTER IS THE BEST APPLIANCE, FOR PREVENTING FORMATION OF ICE IN GASHOLDER CUPS, IT IS IN USE AT MANY IMPORTANT WORKS IN ENGLAND, GERMANY, AUSTRIA, AND AMERICA.

ELECTRIC FITTINGS DYNAMOS MOTORS.

ALEX. C. HUMPHREYS, M.Inst.C.E. A. G. GLASGOW, M.E.

MESSRS. HUMPHREYS & GLASGOW

Have during the past 2½ years constructed

CARBURETTED WATER-GAS PLANTS

Of the following daily capacities:—

Copenhagen	700,000 Cub. Ft.	Brussels	700,000 Cub. Ft.
Belfast	1,700,000 ,,	Liverpool	2,500,000 ,,
Glasgow	300,000 ,,	Tottenham	600,000 ,,
Santiago	400,000 ,,		

And have now under Contract:—

Belfast (Second Contract)	3,500,000 Cub. Ft.	Southport	750,000 Cub. Ft.
Brighton	1,250,000 ,,	Manchester	3,000,000 ,,
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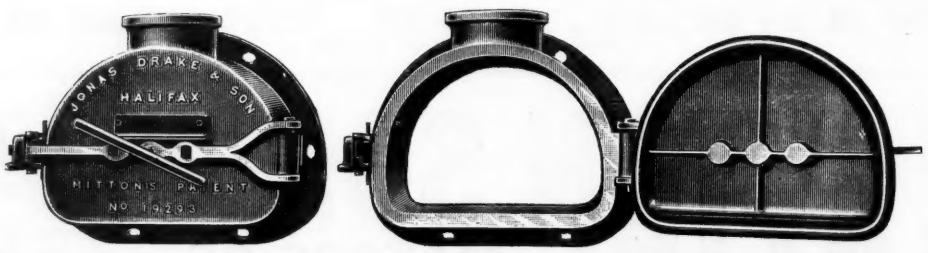

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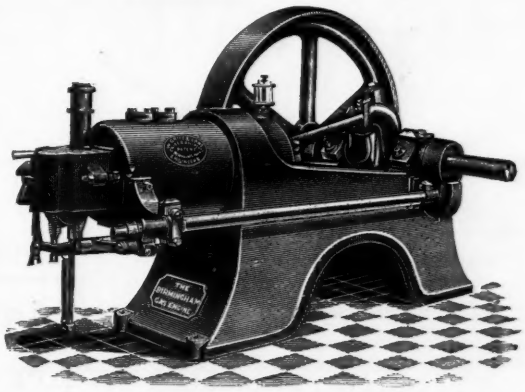

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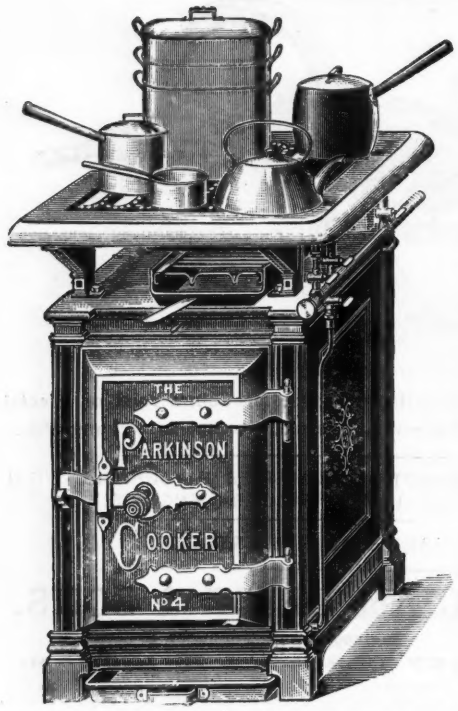

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[See also Advt. p. 1182.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, June 4, 1895.